AMERICAN DYESTUFF REPORTER

"Circulated Everywhere Dyestuffs Are Used"

Devoted to the practical application of dyestuffs in all industries; especially to t extile chemistry—the science and practice of scouring, bleaching, dyeing and finishing.

VOLUME X | NEW YORK, MAY 22, 1922 | NUMBER 11

The Job Dyehouse

Location—Building and Power Plant—Equipment: For Piece-Goods Dyeing; Hosiery; Raw Stock; Drying; Water Softening—Operation: Scouring—Piece Goods; Bleaching; Dyeing; Finishing

By A. T. BRAINERD

H. A. Metz & Co., Chicago, Ill.

CONSIDERABLE interest has lately been manifested regarding the industry known as job dyeing, and information has been sought concerning its possibilities. A brief outline of the requirements and experience essential to operation of the business may be of some enlightenment to those contemplating entering this field, as well as a statement of fact to those who are customers of the job dyer, calling their attention to the broad scope of the business which serves them. It is hoped that some points mentioned may be of interest to the smaller job dyer himself. His variety of work produced is so great that perhaps he has not given sufficient consideration to some important subjects. Such an outline can contain no details of arrangement of equipment or expense of installation. These must necessarily depend on the available or projected building and the desired production.

Location

The location should be desirable as regards accessibility for labor, from the standpoint of both employer and employee. Labor must be available and must have transportation to and from the plant. A railroad siding is of great advantage, if car-lots are to be handled, and haulage cost must be considered if trucking is necessary. A low-rent neighborhood is required so far as this combines with other necessary qualifications. There must be an abundant supply of water as free from minerals as possible.

Building and Power Plant

Space is required for dyeing machinery, drying, storage, shipping, office, laboratory and boilers. One of the chief considerations in building or remodeling should be ventilation of the dyehouse. Ventilating equipment should be installed which will insure entire freedom from steam, at least to a point 7 or 8 feet above the floor.

The boiler capacity must be sufficient for steam required for all machines and drying equipment, plus a margin for overloading or speeding up and for increasing production. Steam for heating must be taken into consideration if the distances carried are great enough to cause loss through condensation in piping. Less than 100 pounds of steam pressure should not be considered sufficient boiler capacity for a plant of four or five dyeing machines and a corresponding number of tubs and driers.

The power transmission must be properly planned. It is generally recognized that motor-driven machinery is economical and advantageous.

Equipment

Yarn.—Two types of yarn-dyeing machines are in general use. The Hussong (circulating type) and Klauder-Weldon or Giles (rotary type) are most largely used for skein dyeing. There is a difference of opinion among dyers as to which is superior. Both are entirely satisfactory. The circulating machine doubtless has more points in its favor. The volume of dye liquor is smaller, which effects a saving in dyestuffs in many cases; the yarn is rather tightly packed in the machine, and consequently the danger of felting is remote; contrary to some opinions, there is practically no danger of tangled skeins. Many dyers, however, prefer open machines, probably because they want to see their shades while "coming up." Some insist that the material, especially woolen and worsted yarn, needs action of the air in dyeing—a rather improbable contention. Confidence being a large factor in successful work, a man is likely to produce best results using equipment with which he is familiar and in which he places his trust.

Interior of a Modern Yarn Dyehouse—That of the Franklin Process Company at Providence, R. I.

A sufficient supply of hand tubs should be available to take care of all small lots and of special jobs where the use of a machine might cause complications, as in mordanting of yarn with sumac where contact with iron would have a detrimental effect.

Scouring machines are almost a necessity. Many dyehouses have never used them, but they are now recognized as proper equipment for worsted yarn as well as woolen. The latter is almost always scoured in chains, in a machine; while worsted yarn, if containing only an easily saponifiable wool oil, may be successfully scoured in either type of dyeing machine. When handling in Hussongs, one machine of the battery is reserved for scouring, and rinsing is done in the same machine in which the yarn is to be dyed. This system is economical, as the scouring bath is retained while the yarn is run over the track to the desired machine for dyeing.

Vats are required for bleaching cotton yarn. These are now usually built of smooth-finished concrete, and arranged in a group in one end of the plant, where chloride of lime or fumes are not likely to come in contact with material being dyed. A sulphur house is necessary for economical worsted-yarn bleaching. This must be outside of the dyehouse.

Piece-Goods Dyeing.—The ordinary piece dye kettle, such as is used for flannels, etc., is proper for all woolen, worsted or union dress goods, linings, etc., which are likely to come to the job dyer. Equipment for this work ought to consist of at least two kettles, one for light and one for dark shades. If space is available an additional large-size machine will prove economical so that big lots of one color may be dyed in quantities. A tenter frame and press are essential for finishing piece goods, and the investment for such machinery will amount to a considerable sum of money.

Cotton piece dyeing requires jigs and pads, and the equipment should include a continuous machine if sulphur color work is to be done. A frame is necessary, also drying cans with stretcher, starch box, etc. It can readily be seen that piece dyeing and finishing equipment requires so large an investment that the smaller dyehouse will do well to confine its activities to other materials. The large finishing plants in this country are so well equipped for handling piece dyeing business, especially in cottons, that the smaller converter would doubtless find discouraging competition.

Hosiery Dyeing.—A considerable amount of hosiery dyeing business has been available during the past few years, in spite of the fact that most of the large manufacturers operate their own dyehouses. Quite large quantities can be handled with proper machinery and, due to the comparatively high value of material, especially silk hosiery, good prices can be obtained for dyeing.

Rotary-type machines are in general use for both boiling off and dyeing. The ordinary laundry machine operated at slow speed can be successfully used. For sulphur blacks a basket machine, or rotary machine with pumping apparatus to remove and store the dye liquor, is most satisfactory. Considerable space, as well as proper steam pressure, is necessary for drying forms if any amount of hosiery dyeing is to be done.

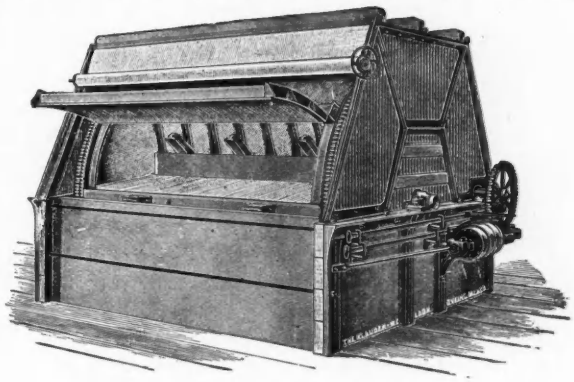
Raw-Stock Dyeing.—Circulating type, preferably basket, machines are considered most desirable for any class of raw-stock dyeing, chiefly on account of time and labor saving in operation. Dyed shades are more uniform and level than can be produced in tubs unless much attention

is given during the dyeing operation. Rotary-type machines are largely used for loose wool and are found satisfactory in every way except in speed of production. They are more adaptable for lots smaller than machine capacity and, as is true of all open machines, sample taking is easier. Rotary machines have another advantage in that satisfactory results can be obtained with some dyestuffs that are not thoroughly soluble enough to produce successful results in the circulating machines.

Drying Equipment.—The drying capacity must be sufficient to take care of production, with a safe margin for overloading. Nothing is more detrimental to the morale of a dyehouse than shutting down machines to await catching up in the drying or packing. It is true that drying yarn or stock may proceed night and day, but in case of a rush of business, dyeing machinery may be operated twenty-four hours a day, so the maximum drying capacity should equal the greatest amount that can be turned out of the dyehouse. Many satisfactory yarn driers are on the market, but a built-in dryer is probably the most economical. Circulation of air is the foremost factor, being much more important than heat in producing rapid drying. A built-in dryer, partitioned in the center with powerful fans circulating heated air, has been found to produce excellent results with any skein material. Revolving reel dryers are largely used and give satisfactory service. When loaded with damp yarn and in motion they develop a terrific centrifugal force, so must be of sturdy construction. Practically no steam is used when reel drying, but considerable additional power is necessary.

Raw stock is usually dried on wire-bottomed, built-in trays set in a gable position, so that circulation of warm air within the surrounding frame effects the maximum drying surface. Considerable time is necessary for drying raw cotton on account of the compact mass it forms when wet.

Water-Softening Plant.—Unless the dyehouse is most fortunately situated where there is an abundant supply of soft water, a softening plant is almost a necessity. Many manufacturers and dyers were loath to make the initial investment required when the softening devices were first put upon the market, but repeated demonstrations in practice have proven so conclusively the value and saving of water softening that the advantage is no

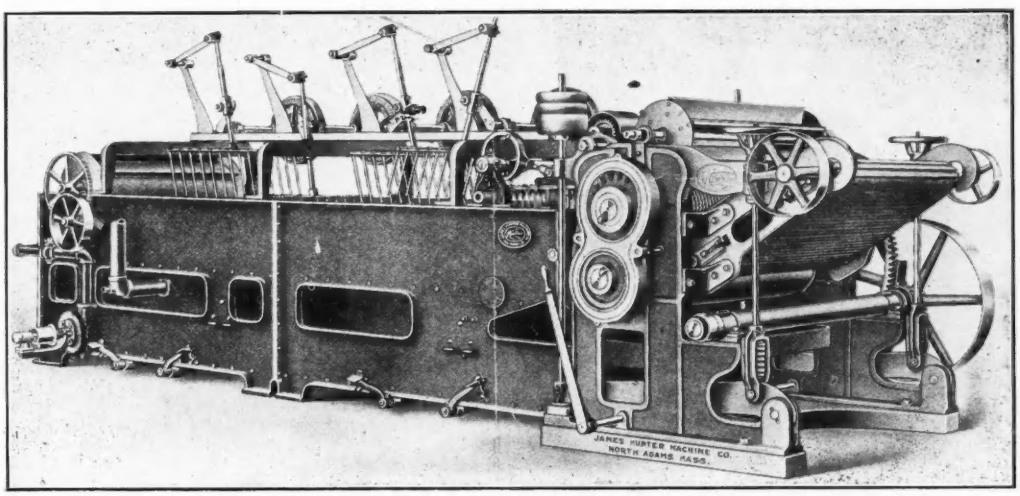


Klauder-Weldon Dyeing Machine for Loose Stock

longer questioned. The manufacturers of water-softening equipment have abundant proof that they can save the cost of their plants in soap bills alone in remarkably short periods of time. There is undoubtedly saving in dyestuffs in many cases, and the efficiency of production and lack of redyeing due to faulty scouring is a revelation.

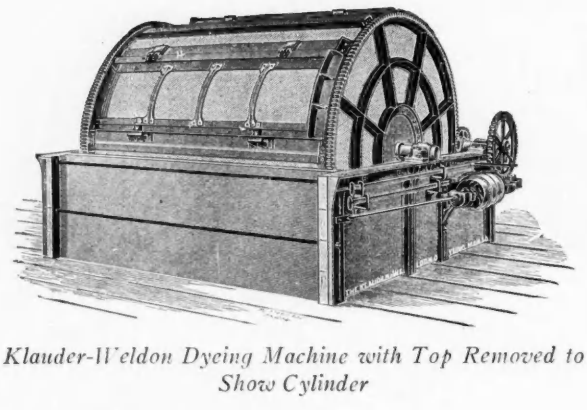
Miscellaneous.—Besides the above-mentioned machinery and equipment, there are numerous other necessary items. These include hydroextractors sufficient in number to take care of maximum production, motors for machines and fans, motor truck, dyehouse trucks, balers, scales, measuring clocks for piece goods, dye sticks, horses, pails, sieves, piping, belting, tools, laboratory equipment, office equipment, drug room, etc.

Materials.—A final important item to be considered in respect to the original investment is supplies of materials.



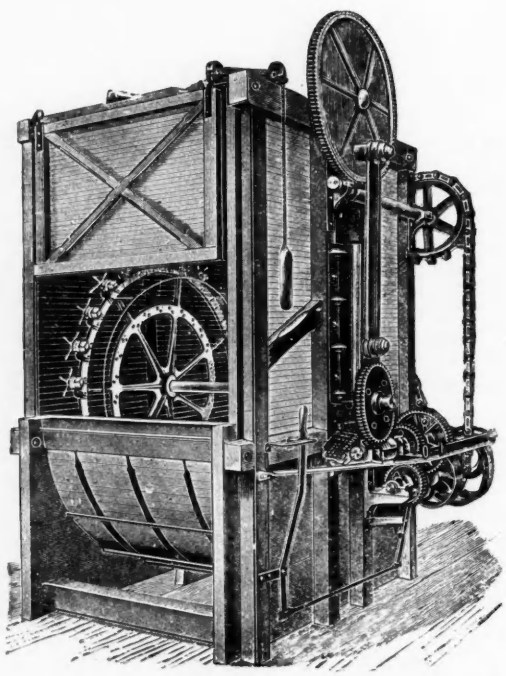
Scouring Machine—James Hunter Machine Company

While it has become a national custom to purchase stocks on a hand-to-mouth basis, nevertheless a dyer must always have at his immediate disposal an adequate supply of coal, soap, dyestuffs and chemicals. The number and quantity of dyestuffs always on hand will depend on the variety of work produced and the business at hand. Falling markets must be watched, but fair quantities



Klauder-Weldon Dyeing Machine with Top Removed to Show Cylinder

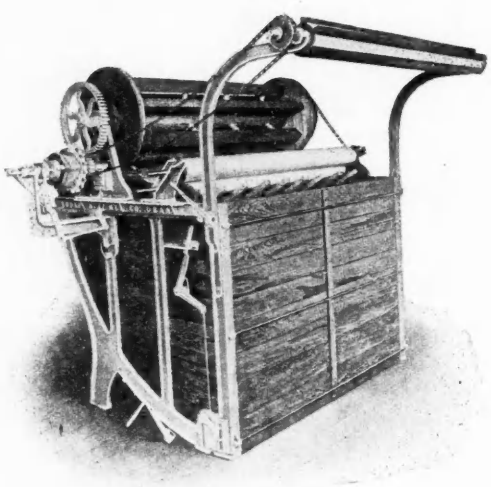
must be purchased in order to obtain the best available prices and terms. It is always well to bear in mind that cash on hand is an important item in this, as in any business. Sound financial standing is of as much benefit when soliciting business as when seeking credit.



Klauder-Weldon Silk Skein Dyeing Machine, Showing Dye-Wheel in Working Position

Operation

Scouring.—So far as yarns are concerned, especially woolen and worsted, the preliminary operation—viz., scouring—is by far the most important. Many dyers are expert colorists, but they have neglected to study thoroughly the scouring process. It is the job dyer's biggest problem, because he does not know the stocks or wool oil used in the manufacture of the yarns that come to him. He has only the smell and feel of the yarn and his past experience on which to base his judgment of the proper scouring method. Closely watching the first batches of unfamiliar stocks and keeping records of shrinkages, uneven dyeings, etc., will supply facts for future use. Undoubtedly 90 per cent of woolen and worsted yarn dyeing troubles are due to imperfect scouring or failure to remove all traces of soap before entering the yarn in the acid dye bath. Yarn from practically every manufacturer will require a somewhat different treatment in



Rodney-Hunt Piece Dyeing Machine

scouring. The amounts of soap and soda, the time and the temperature may all vary with different yarns. Excesses should be avoided, of course, as yarn is easily felted, yellowed and made harsh from too vigorous scouring. A small addition of ammonia to the last rinse is of assistance in removing the last traces of soap. There is only one definite rule for scouring, which is: *The yarn must be clean.* Subsequent operations will not fail to show any infraction of that rule.

Piece Goods.—The scouring of woolen and worsted piece goods is of equal importance, but is not likely to be of particular interest to the job dyer, as most material of this class which he receives is for redyeing. Unless the goods are very dirty, a thorough wetting in hot water will usually suffice. Cotton piece goods (gray goods) present a problem which the job dyer, as referred to in this article, will be happy to avoid. Unless equipped with kiers and high-speed drying and finishing machinery, he

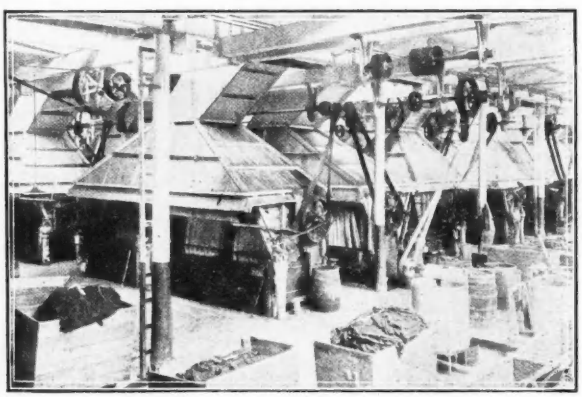
cannot handle dyeing or bleaching of fine cotton goods. The cheaper job of dyeing cotton drills where removal of motes or bleaching is not necessary can be handled on pads or jigs by wetting out in caustic or diastofor before dyeing.

Bleaching.—Yarn properly prepared can be bleached satisfactorily and very little trouble encountered if definite established methods are followed. Cotton yarn must be thoroughly and completely boiled out, preferably in a kier, before bleaching is attempted. The chloride of lime bleach is practically universally used for cotton yarn or piece goods. Definite methods of procedure are given in many available books, but a bleacher, probably more than any other finisher of cottons, must have practical knowledge on which to work.

Sulphur bleaching for worsted yarns and peroxide for silk and cotton hosiery are generally established methods. Information regarding the practice of both of these is readily available.

Dyeing.—Woolen and worsted yarns form a considerable part of the job dyer's business. A large number of spinners do not operate dyehouses, and consequently their customers, principally sweater manufacturers, buy yarn in the oil and sent it to the dyer with orders for colors as needed.

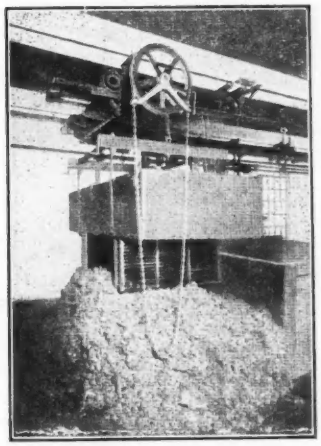
Acid colors chiefly are used for this class of work. They are of sufficient fastness for all ordinary requirements and possess the brilliancy of shade desired. Level dyeing and fastness to rubbing qualities, together with reasonable precaution for light fastness, are the chief concern of the dyer. Practically all acid colors work in combination with each other, though care is necessary in



Battery of Rodney-Hunt Dyeing Machines

choosing combinations of approximately complementary colors. In mixing orange and blue or blue-green, for example, dyestuffs which exhaust together should be used in order to avoid mottled effects. Advantages in cost of dyestuffs will be obtained if certain of the cheaper dyestuffs which are perfectly level dyeing in full shades are used when suitable, and others, usually more expensive, kept for shading or for use in formulas calling for light percentages. Many of the acid colors now available are entirely suitable for adding to the boiling bath where shading is necessary.

Long boiling of acid colors is most advisable, especially in rotary-type machines. Uniformity and solidity of shade are much more satisfactory if dyeings are allowed full time. Formulas should be so developed that it is not necessary to sample every few minutes and pull the plug the instant the shade is correct.



Cage of Hussong Machine Discharging Batch of Raw Stock

Other things being equal, cost of dyestuffs should, of course, decide what products are used. The dyer is entitled to know, however, just what he is getting when he changes to a cheaper color. Therefore the reliability of a salesman and the firm he represents may be a deciding factor in the adoption of one of several competing dyestuffs.

Cotton yarn is practically always dyed with direct colors, the exceptions being basic colors for brilliant shades and vat, sulphur or developed colors for extreme fastness. Most direct colors are level dyeing, though it is advisable to have specialties on hand for mode shades, light grays, etc. Fastness requirements are not usually exacting, and present available dyestuffs give the dyer a considerable choice of suitable materials. Direct colors suitable for after-treatment to enhance fastness to washing are now available. These, with developed blacks, make possible the production of a fairly complete range of the better class of direct colors. When using circulating machines, standing baths should be kept and, whenever possible, yarn dyed without boiling out, except that it should be boiled a few minutes in the old dye liquor before the additional dyestuff and salt are added.

Basic colors are used for brilliancy only, and whenever possible they should be dyed on a sumac extract mordant rather than topped over a direct color. Brighter shades are obtained and a more stable color lake formed with the tannin antimony mordant. In topping, where this is resorted to on account of lower cost of manipulating, high temperatures must be avoided. When mordanting

with tannic acid, great care must be exercised, else uneven results will be obtained in spite of all precautions in dyeing.

Sulphur and vat color dyeing requires wooden tubs with iron fittings. Dye baths must be carefully prepared and kept in proper condition. The yarn should be kept below the surface of the dye liquor as much as possible to avoid uneven oxidation.

Artificial silk, being largely used at present, must be given consideration. It offers no particularly difficult problem in dyeing, provided the stock in each batch is the same. However, two different yarns will be dyed distinctly different shades in the same dye bath. Direct colors are used for dyeing artificial silk, and should be chosen according to their level dyeing properties. The attraction of this fiber for dyestuff is very great, hence baths are rapidly exhausted. It is advisable to keep the temperature below 190 deg. Fahr., as the strength of the fiber is seriously impaired while in a boiling bath. The natural strength returns on cooling and drying, but serious breakage may occur if care is not taken during the dyeing operation.

The acid and direct colors used for yarn dyeing will suffice for all ordinary requirements for piece goods. Neutral dyeing or union colors are also largely used on dress goods, due to low cost and simplicity of application. Most redyeing being in dark shades, the union colors are of satisfactory brilliancy and by their use speck dyeing is avoided.

Hosiery dyeing requires sulphur black for most of the all-cotton material that will come to the job dyer. Direct colors, perhaps after-treated, are used for colors on all-cotton, as well as for silk-and-cotton, hosiery. For the latter special color combinations must be worked out. In general, it can be said that foundation colors which dye cotton and silk alike in one bath should be used, and an adequate supply of dyestuffs for shading either fiber in a neutral salt bath should be kept on hand. Many other combinations of yarns, such as wool and cotton, wool and silk, wool and artificial silk, are now used for hosiery. Formulas must be worked out according to results desired. These often call for various two-tone effects.

Developed black is now almost universally used for solid black on silk and cotton hosiery. The apparatus for dyeing should include a pump and tank for storing dye liquor so this may be saved while the diazotizing and developing are being carried on in the dyeing machine.

Loose wool is almost always dyed with chrome colors, in order to produce a shade of sufficient fastness to withstand subsequent operations in manufacture. The top-chrome or metachrome process is generally used. The latter method is of advantage on account of saving in time and admits of easier shading, but it is not entirely satisfactory as regards fastness when heavy shades are dyed. The chrome mordant, two-bath method is recognized as producing the fastest results, and dyeing to sample is easier than by the top-chrome method. Bottom-chrome dyeing, however, requires additional time and considerable more labor, unless machines are used.

Raw-cotton dyeing that will come to the job dyer will most likely be sulphur black. This should, of course, be handled in a circulating, preferably vacuum-type, machine. The dye liquor must be forced through the material under great pressure to insure penetration to all parts of the batch. The sulphur black liquor must be kept properly dissolved and of correct density by means of frequent testing with the hydrometer.

Finishing.—As suggested above, the job dyer will do well to avoid taking in material that requires any great amount of finishing machinery. In fact, piece-goods converting does not concern the job dyer except as a separate department in a large plant. The finishing of yarns and stock consists only in drying, conditioning and packing, and the only requisites are proper facilities for expeditious handling.

AMERICAN DYE PLANT TO PRODUCE CARBAZOL

The Thatcher Process Company, Syracuse, N. Y., organized two years ago to produce anthraquinone, the principal basis for a long line of alizarin dyes previously produced at a profit on a commercial basis only in Germany, is to quadruple its capacity and add to its output a new product, carbazol, not hitherto manufactured in this country. New capital to the amount of $150,000 will be sought.

Carbazol as produced in other countries is gray. The product made here is white and 99.5 per cent pure. Both dye bases are produced here electro-chemically.

NATIONAL AT THE KNITTING ARTS EXPOSITION

At the Eighteenth Annual Knitting Arts Exposition, being held in Exposition Hall of the Commercial Museum, Philadelphia, the National Aniline & Chemical Company, Inc., will occupy spaces 89, 90 and 91, where the company will have on display a varied assortment of knitting yarns and knitted fabrics of all kinds, representing the last word in the application of dyes manufactured by this company to that class of material.

Members of the technical and sales staff of the company will be present to welcome and greet all those interested in the latest developments of the use of color as applied to knitted fabrics.

The Empire Fuel Company, Dallas, Texas, is planning for the construction of a by-product dye and chemical works in connection with a new lignite briquette plant at Rockdale, Texas. Adam H. Davidson is chairman of the board and treasurer.

Abstracts of A. C. S. Dye Division Papers, Spring Meeting

FOLLOWING are abstracts of papers delivered before the Dye Division of the American Chemical Society at the Spring meeting of that organization, held this time in Birmingham.

Before starting the papers, the Secretary of the Division, R. Norris Shreve, enumerated a few of the activities in which the officers of the Division had been engaged since the last meeting. In accordance with the resolution of the Division at the Rochester Meeting in the spring of 1921, the Secretary of Commerce was petitioned to supply the information on individual dye marks that had been elided from the Norton Census of Dyes because of the protest of the importers of German dyes. In accordance with this resolution the Bureau of Foreign and Domestic Commerce prepared a supplement to the Norton Census, giving this desired information. These supplements have been distributed to all registered members of the Division and also to other interested parties.

The Secretary of the Division has also been co-operating with the Society of Dyers and Colourists of Bradford, England, in the preparation of the Color Index. The Co-operation Committee of the Division had one meeting in the early winter with the Color Laboratory in Washington and the report of this visit was made to the Division.

Several men were prevented from attending and their papers were read by title. Dr. Max Phillips of the Color Laboratory in Washington read a paper by himself on "The Preparation of 7, 7'-Di(-hydroxy-isopropyl)-indigo," and he also presented a paper by H. L. Haller of the same laboratory on "The Preparation of Phenylglycine-o-carboxylic Acid. I—From Anthranilic Acid and Monochloracetic Acid." Dr. E. Emmet Reid of Johns Hopkins spoke about some work which he and Mr. Waldron had been doing on azo dyes containing sulphur. Dr. Reid exhibited samples of dyeings showing that when sulphur was in a position directly bound to the benzene ring its influence was to deepen and redden the shade of azo dyes. Dr. M. T. Bogert described work which he and Dr. Meyer had done on "Experiments with Dehydrothio-p-toluidine and Related Compounds." Dr. Bogert announced that quite recently he had prevailed upon Columbia University to relieve him of all his work except that pertaining to dyes, intermediates, and related compounds. Dr. Jules Bebie described a number of uses for the saccharin by-product, p-toluenesulphonyl chloride. "The Analysis of B-Naphthylamine" by a number of different methods was described by Messrs. Henry R. Lee and D. O. Jones.

The Preparation of Phenylglycine-o-Carboxylic Acid from Anthranilic Acid and Monochloracetic Acid

By Herbert L. Haller

A study of the preparation of phenylglycine-o-carboxylic acid from anthranilic acid and monochloracetic acid has been undertaken. Optimum conditions have been determined for (1) concentration in water of the reacting substances, (2) time allowed for reaction, (3) ratio of reacting materials, (4) condensing agent, and (5) temperature of reaction mixture.

The Influence of Sulphur on Colors of Azo Dyes

By W. R. Waldron and E. Emmet Reid

Some thirty different bases containing sulphur in a variety of positions and associated with various alkyl and aryl radicals have been prepared, diazotized, and coupled with representative dye intermediates to form dyes so as to show the influence of sulphur groups in various positions on the color. Bases having sulphur in the sulphide and sulphone condition have been compared with the sulphur-free bases and it has been found that the sulphide sulphur is bathochromic while the sulphone group is usually hypsochromic.

Experiments with Dehydrothio-p-Toluidine

By Marston I. Bogert and Martin Meyer

When dehydrothio-p-toluidine is subjected to the Skraup reaction, it yields the corresponding benzothiazolyl quinoline. The Atophan reaction was unsuccessful. Attempts to prepare dehydrothio-p-toluidine by fusion of nitro-toluene or p-nitrobenzal-p-toluidine with sulphur gave very poor yields of the product sought. 2-p-toluyl-benzothiazole was prepared by the Jacobsen method from thio-p-tolanilide and some of its derivatives investigated.

Uses of p-Toluenesulphonyl Chloride in the Manufacture of Dyes and Intermediates

By J. Bebie

p-Toluenesulphonyl Chloride is a by-product in the manufacture of saccharin. A great amount of chemical work has been devoted to the utilization of this material and one of its derivatives, Chloramine-T, is generally known as an excellent germicide. Other derivatives have found application in the dye industry. The p-Toluenesulphonyl Chloride itself can be used in various ways in the manufacture of dyes and inter-

mediates, particularly as a component or a part of a component for the production of various classes of azo dyes and in the combination with azo dyes containing hydroxyl groups with the purpose of making the resulting dyes fast for alkali and soap.

The Application of the Direct Dyes in Coloring Paper

By Walter C. Holmes

The customary trade practice for sized papers is ineffective owing to the formation of considerable proportions of aluminium lakes of undesirable characteristics. Maximum tinctorial strength and brilliance are conditioned, in general, upon insuring maximum color absorption in the form of dye and the retention of the residual color in the form of the calcium, or other suitable lakes. With ground wood furnishes, complete color retention in the latter form is advisable.

A considerable range of attractive shades of superior fastness to light may be obtained by a judicious employment of the copper lakes of various individual dyes and dye combinations.

On the Preparation of 7:7 Di-(Alpha-Hydroxy-isopropyl) Indigo

By Max Phillips

Starting with para-cymene obtained from "sulphite turpentine" and using a modified procedure of the Heumann phenylglycine-o-carboxylic acid synthesis of indigo, a new indigoid dye has been prepared. The method used consists in first nitrating para-cymene, then oxidizing the nitro cymene to o-nitro-p-hydroxy-isopropyl-benzoic acid; reducing this to o-amino-p-hydroxy-isopropyl-benzoic acid; condensing the latter with monochloracetic acid to hydroxy-isopropyl-phenylglycine-o-carboxylic acid and finally fusing with potassium hydroxide.

This new dye has a similar absorption spectrum to that of indigo and has quite similar dyeing properties.

The Analysis of Beta-Naphthylamine

By Henry R. Lee and D. O. Jones

Methods are presented for the analysis of Beta-naphthylamine in the presence of its common impurities, namely: beta-naphthol, alpha-naphthylamine and B-B-Dinaphthylamine.

By sulphonation of beta-naphthylamine the nitrite titration can be applied in the presence of beta-naphthol

A separation of beta-naphthylamine from beta-naphthol and B-B-Dinaphthylamine is made by precipitation of the former as the hydrochloride from benzene solution. The hydrochloride is dissolved in water and titrated with N/2 nitrite at 32 to 40 deg. Fahr. The benzene solution is evaporated to dryness and the beta-naphthol determined by titration with diazo-p-nitro-benzene.

The Kjeldahl Gunning method has been modified by sulphonation of the sample with 25 per cent oleum in the cold and the use of a glass wool plug in the neck of the flask during digestion.

Beta-naphthylamine, alpha-naphthylamine, beta-naphthol and B-B-naphthylamine were prepared in the pure state and some of their physical constants determined.

Melting point curves are given for beta-naphthylamine with each of these impurities up to 10 per cent.

Function of Assistants Used in Cotton Dyeing

By Andrew J. Leddy

Directs and Sulphurs

A. The Direct Dyes.—They are usually applied to cotton from an alkaline bath containing a sodium salt. The alkali rectifies the hardness of the water, softens the material and causes better penetration. The sodium salt is used to decrease the solubility of the dyestuff by increasing the number of sodium ions.

B. The Sulphur Dyes.—The sulphur dyes are applied to cotton from a bath containing an alkali sodium sulphide and a sodium salt. The sodium sulphide is used to dissolve the dye which is insoluble in water. The excess alkali probably aids the solubility. The main functions of the alkali and sodium salt are the same as with the directs.

Basics and Vats

A. Basics.—The basics have no affinity for cotton. The cotton must first be treated with a weakly acid mordant, usually tannin. The tannin is subsequently rendered insoluble by treatment with a soluble antimony or iron salt. The dyestuff combines with the mordant to form an insoluble compound.

B. Vats.—The vat colors are insoluble in their natural state but are capable of reduction to a leuco compound. They are usually applied to the fiber from a bath containing sodium hydrosulphite and an alkali. The hydro reduces the dye. The alkali aids in keeping the reduced dye in solution and never should be omitted.

NEW LABORATORY FOR TUFTS

The construction of a new chemical laboratory at Tufts College, College Hill, Mass., which, when completed, will be one of the finest and most modern buildings of this type in the United States, has been authorized by the trustees. The laboratory will be erected on Tufts Field and face on Talbot Avenue. The architects are Edward H. Rockwell and Edwin H. Wright. The department of chemistry at Tufts is in charge of Prof. Frank W. Durkee.

The new structure will be 60 feet in height, of four stories, including the basement, or ground floor, and will measure on the ground 166 by 78 feet.

Notes on Dyeing Wool and Worsted Pieces

Importance of Full Information for the Dyer—Fulling as a Cause of Cloudedness—Losses from Mineral Soaps—Zeolite Rectification—Carbonizing Before Dyeing—Yellowing of Silk and Cotton Resists—Chrome Mordants—Green vs. Yellow Mordants—Assistants—Single Bath Chrome Methods — After-Chrome Methods — Acid Colors—Making Sure of Good Solutions—Hints on the Dyeing Operation

By JOSEPH A. KNOX

THE problems of the dyehouse do not begin with the delivery of the already fulled gray goods to the dyer; they begin back in the mixing room where the various qualities of wool are laid down and sprinkled with oil emulsion, preparatory to carding. There is not so much difference between any natural wool and noils, but when there is introduced lime fulled wool, sulphide wool, alumina carbonized wool and stripped shoddy, the fiber mixture which goes to make up the yarn is almost as sure to give a mixed or mottled effect in dyeing as a mixture of cotton, silk and artificial silk. There is no general rule which will help the dyer in handling such a mixture; certain dyes seem to produce more level effects than others, just as some cover kemps better than others; but this quality is separate and distinct from what is generally known as the level dyeing quality. When such a mixture of wools is present it is very desirable that the dyer should know it, so he can take precautions and possibly have the colors he intends to use tested out on the goods in the laboratory. If this is not done beforehand, the final result will look more like a stock mixing than a piece dye. Every dyer is familiar with the stripes that run across the goods when a stray bobbin of filling from another mixing has been shot in by mistake and sometimes the color is seen to change from light to dark, right in the middle of a piece, where the weaver started on to a new lot of filling.

Dyer Should Be Informed

Such faults cannot be corrected, but they are mentioned to impress on others that they are not to be blamed on the dyehouse—the dyer must be kept in mind from the time the fabric is designed until it is sold. Dyeing and chemistry have accomplished wonders, but they cannot accomplish miracles.

The spinning emulsion needs much attention—we admit that many mills are able to use mixtures containing mineral oils and save some money at that point. We suggest that they make a calculation as to the amount this saving is offset by later expenses and troubles in scouring and redyeing. The proper lubricant for wool is conceded to be red oil; this may be emulsified with water and soda ash and later its full equivalent in soap may be omitted, or even a greater quantity, as a little extra soda in the fulling soap will convert it all into an efficient scouring medium and still give cleaner goods than where mineral oil was used. A further advantage is to add some sulphonated oil, which promotes its emulsifying properties to a high degree.

Fulling as a Cause of Cloudiness

Fulling may also be responsible for clouded pieces. Most fullers use a very alkaline soap and, as the goods are run in rope form, it is easy to see how certain parts may be unduly subjected to the heat, alkali and mechanical action, and differ in physical nature from the parts that have not received the full severity of the treatment. Differences, even slight, in the density of the felting and in the amount of raised surface fiber, will always show as clouded effects on the finished piece.

As the soap must be washed out of the fulled goods and as the scouring must be done afterward or, at least, rinsing until free from soap, we had better consider the water supply.

Losses from Mineral Soaps

Most people are familiar with the formation of lime soap; it is the curdy deposit we notice collecting around the sides of a bathtub soon after soap has been put into the water. In some districts it is much worse than others, but there is hardly a part of this country where it does not exist to some extent.

If it were only the loss of soap caused by the lime it would not be so serious, although the yearly loss in any mill is an amount that would cause much anxiety if it were fully realized. The mineral soaps—lime, magnesia, alumina and iron—are all waxy masses that are insoluble in water and which adhere to the goods in small lumps. Heat melts them and they waterproof and resist the fiber against dyeing for a time.

Gradually the acid of the dye bath decomposes them and the dyeing proceeds, but later the finished piece shows light spots that seem to be without any reason for existing, as the material which caused the trouble has vanished.

Zeolite Rectification in Practice

Many up-to-date dyeing establishments have water purification systems using zeolite masses; these plants have water troubles also, generally because they regenerate the mass on stated days rather than by a rule based on the amount of water used. Whenever the mass becomes exhausted the troubles reappear, but this is the strongest kind of an argument in favor of such a system—when rightly used.

Where such purification systems are not available the addition of sodium phosphate or sodium fluoride to the water, even immediately before use, will cause the mineral matters to form insoluble phosphates or fluorides and prevent them from uniting with the fat acids of the soap. Piece dyers often run the goods for twenty minutes in hot water containing a little ammonia, as a precaution, immediately before dyeing, to remove any traces of soap that may not have been rinsed out in the regular operation.

The soap question next demands attention. In former years it was believed that the heavy body of tallow soap was necessary to get the best results, but unfortunately it is also the most difficult to rinse out of the goods. Soda soaps are harder and less soluble than potash soaps. Stearic acid soaps are harder and less soluble than oleic acid soaps, which practically means that soaps from vegetable oils are more soluble than those from animal fats.

Palmitic Acid Soaps, Real and Fictitious

However, there is a class of soaps which meets the requirements of being heavy bodied, raising a dense lather, and still being of very good solubility; these are from palmitic acid, supplied by cocoanut and palm oils. Soaps made from palm or cocoanut oils lather in hard water and also in salt water; hence they are not likely to form curds of lime soap in cases where the water is not pure.

Many mills are now using palm soap in their fulling with great success, but many troubles also result from the purchase of fictitious palm soaps from irresponsible dealers, who sell tallow soaps colored in imitation of palm oil.

Carbonizing Before Dyeing

Some manufacturers carbonize before dyeing, more carbonize afterward, and a few speck-dye. It is difficult to dye level on carbonized cloth, and it is also a good rule not to dry the goods after scouring but to run them at once into the dye bath. Goods containing alkaline soap undergo some changes on the edges of folds exposed to the air and clouds will later appear on the finished pieces that may be hard to explain. There should be no long delays between fulling and dyeing, but if there are, or if the material has been dried, a run in hot water and ammonia in the piece-dye machine is the best preliminary treatment. Carbonizing before dyeing is done with sulphuric acid but carbonizing after dyeing may be done either with acid or by the aluminium chloride process. It would introduce many difficulties if the alumina method were used before dyeing. Acid carbonizing requires a complete neutralization with soda, as water alone will not remove the acid, it being chemically combined with the wool; the wool is what the dyer calls "soured." After neutralization a good rinse is also advisable for, while the acid of the dye bath would again neutralize any excess of soda, it would produce an uncertain condition and we would never be sure just how much acid was available to work the dye.

Yellowing of Silk and Cotton Resists

We must now go back to the construction of the goods. Often pieces contain threads of white or colored silk or cotton, which are to be left undyed. That is not all; they must be able to stand the fulling and perhaps carbonizing. White silk may be resisted if acid dyes only are to be used, but if bichromate is used, either in the single-bath method or after-chrome, it will be noticed that the chrome has oxidized the tannin of the resist and produced a dull yellow. White silk effects with chrome colors may be had with pure unresisted silk, but it should be remembered that all the resisted colors are also made yellower from the same cause and if they suffer in brightness it is not the dyer's fault. Various vat dyes on the silk will go through the necessary operations without being resisted, only it is important that the dyer choose dyes for the piece dyeing that do not stain silk.

Chrome Mordants

For dyeing the goods there is a choice of several methods according to the requirements. The first is the chrome mordant, which is used with wood colors, alizarines and gallocyanine or other gallic acid derivatives. Chrome mordants differ not only in the amount of chromium they deposit on the fibers but also in the ratio of chromic acid to chromium oxide—that is, in their oxidizing power. The more chromic acid present, the yellower the mordant; the more chromium oxide, the greener the mordant. Each has its purpose and an excellent dye may be ruined by a badly adjusted mordant.

As an example let us consider logwood extract. Part of this is hematine, or fully oxidized coloring matter, and the remainder is hematoxylon or unoxidized material. If we dyed on a green mordant that had been thoroughly reduced we would obtain only a pale blue from the union of the hematine with the chromium oxide. The bath would not be exhausted and most of the dye would be lost. On the other hand, by dyeing logwood on a yellow mordant the hematine unites directly with whatever chromium oxide is present while

the chromic acid slowly oxidizes the hematoxylon to hematine, which then dyes as before.

Green vs. Yellow Mordants

Now if we use a yellow mordant for the dyeing of certain soluble alizarines or gallocyanine, the free chromic acid at once acts on the bisulphite which is used to make the dye soluble. The mordant is reduced rapidly to the green condition but the dye is spoiled; it has lost its solubility and remains suspended in the liquor, and if it colors the fiber it is only by a loose attachment that allows it to wash and rub off at the first opportunity. Further, the dyes related to gallocyanine are actually destroyed by free chromic acid, and only yield their brightest shades when dyed on a green mordant.

Dyes similar to the chromotropes, which require oxidation, would yield only indefinite shades on a green mordant, although they can only be used in light shades, even on the yellow, being strictly after-chroming colors.

Chrome Assistants

The degree of reduction of the mordant depends, of course, on the quantity of chrome assistant used, as well as the quality. Tartar is a slow, old reliable, generally used when a yellow bottom is wanted, but for better reduction we have lactic, formic and oxalic acids and sodium bisulphite Sometimes only bichromate and sulphuric acid are used, giving hardly any reduction and that only such as may be caused by the wool itself.

After a chrome mordant, *never* dry the goods before dyeing, as it is almost impossible to rewet them so they will dye level.

The use of a chrome mordant is not as popular today as it was formerly, although colors of the highest possible fastness to all influences are to be obtained by the use of the alizarines and other mordant dyes. Dyeing on chrome mordant also has the advantage of giving a sample that indicates correctly the final shade of the goods, and makes accurate matching possible.

Single Bath Chrome Methods

Closely following the chrome mordant method, we have the single bath chrome process. This has several variations. The simplest uses bichromate in the dye bath with the dye and later acetic acid is added. The metachrome process utilizes a mixed mordant consisting of bichromate and ammonium sulphate, which furnishes the necessary acid by decomposition on boiling. Still another process uses a neutral chromium salt which with acetic acid, mordants wool fibers with a non-oxidizing mordant and permits the use of dyes that would be destroyed by bichromates.

The advantages of the single bath processes are that the development of the shade may be followed by sampling, the color goes on slowly and evenly and is more easily controlled in light shades, and lastly that a large number of dyes are available that will leave unresisted silk white by this process. The disadvantage, which is also true of the after-chrome process, is that the dyer may have added some colors for the final matching of the shade and some of the chrome may not have been entirely reduced, so that, when the cloth reaches the spongers, and is steamed, in a roll, there is a further reaction between dye and mordant and curious color changes take place Many a dyer has been blamed for shaded pieces, which had passed inspection once, but which were altered by the work of the spongers after the goods had been sold.

The remedy for this is a final boil for fifteen minutes with some formic acid, which completes the reduction of the free chromic acid and prevents further changes.

After-Chrome Methods

The last class of chrome dyes are those that develop their color and fastness by after-chroming. It is always necessary to dye them slowly and evenly and to exhaust the dye bath before chroming. Acetic acid will work almost all of them at about the proper speed. Glauber's salt retards the dyeing, favors penetration and leveling, but also retards the exhaust and consequently the clearing of silk effects For this reason, when there are unresisted silk effects, it is often recommended to omit the Glauber's salt.

The normal after-chrome dye will develop its full tone in less than a half hour with 2 per cent of bichromate. There are a few blacks that are made dull and rusty if more than 1 per cent of chrome is used and there are some reds, of the carmoisine class, which require 4 to 5 per cent of chrome and two hours' boiling to change them to good blues. Such products can only be used on material that is not likely to suffer from long working.

The Sulphon Cyanines and Acid Colors

The next class of dyes is that of the acid colors, but as an intermediate class we may consider the sulphon cyanines. These are used for navy blues and blacks but have been the cause of much trouble wherever they have been used as neutral or acid dyes While they are not strictly chrome colors, it has been found that they work much better when half their weight of bichromate is put into the dye bath. Even when dyed with the greatest care, either neutral or acid, the finished goods would invariably show light and dark clouds. It is claimed that the wool itself exerts a reducing action on the dye and that the presence of bichromate prevents this action, rather than acting as a mordant.

Two General Classes of Acid Colors

The acid dyes may be divided into two classes—the fast-to-light level dyeing colors and the ordinary acid dyes. The first class includes Alizarine Sapphirol Fast Light Yellows, Crystal Orange, Alizarine Rubinol and a number of azo reds as well as others of the alizarine series. Most of these leave silk effects white and are used on goods for men's wear, fancy shades, light tones and wherever level dyeing and fastness to light are the main requirements. Some goods for women's wear have equally rigid requirements but the others are simply full bright shades that may be dyed with the average acid dye.

Another point that arises, before the dyeing is commenced, is whether to run in the pieces direct from the truck or to "bag" them, i. e. sew the selvedges together with the face of the goods inside. The only valid reason for doing this is in the case of material that shows a tendency to curl into a tight roll on the edges. When this occurs even the best leveling and penetrating dyes will fail to dye the edges as heavy as the middle of the piece. With goods that do not curl there is no need for this precaution. As to the advisability of running goods open instead of in a rope it may be said that as several successful dyers are dyeing tricotines in navy with sulphon cyanines, running in rope, without bagging, it would seem that there is no necessity for running open, except perhaps in the case of mohair plushes. Excessive working in the dye bath may result in permanent wrinkles, but if the goods are dyed in the usual time there is little to fear. Even yarn or loose wool would suffer from too much handling and the same must be counted as one of the hazards of piece dyeing.

Obtaining Good Dye Solutions

Dissolving dyestuff seems such a trivial matter that sometimes it does not receive the attention it deserves. No dye should be added to the dye bath that is not in perfect solution. There is only one satisfactory method, and it should be followed with dyes of all classes. Stir the dry color with cold water until all lumps are broken up and all the dyestuff has been thoroughly wet. Then add boiling water in sufficient amount to effect solution; this is better than boiling the dye solution because most soluble alizarines and gallocyanines are decomposed by boiling.

Additions of dye to a set of running pieces should always be made through the color box or by a pipe extending under the false bottom of the machine. If the added dye is not especially level dyeing, the bath must be cooled first; but in any case, shut off the steam for five minutes when adding any color whatever.

Beginning the Dyeing Operation

In starting the dyeing it is better to add the color, Glauber's salt and part of the acid and slowly raise the temperature. Before a boil is reached the remainder of the acid may be fed on slowly. Good results may be had by adding all of the acid at first and also by omitting it at first and feeding it on later. Every dyer has his own method, but the heavier shades are easier to control than delicate tones, so it must not be inferred that the method used for a seal brown is the proper one for a pearl gray.

The goods, having been dyed to shade, may show that the silk effects are not clear. Generally more acid and chrome will clear the whites, but if not we may add from eight ounces to two pounds of hydrosulphite, first cooling to 140 deg. Fahr., and running about ten minutes. As soon as the silk is clear, run off the liquor and start washing.

Final Precautions

Every dyer knows that cold water run on hot goods has a tendency to set the wrinkles, so the washing is done as the hot liquor runs off. The final caution is that it should be remembered that the baskets of most hydro-extractors or whizzers are made of bronze and many dyes are reddened by copper, so that they show spots where the goods come in contact with the metal. A piece of sheeting to line the basket will prevent this, but it must be washed frequently or our sheeting itself will act as a carrier of copper and cause more stains than the bare basket.

If we bring the goods this far without any faults, they may safely be sent to the finisher and if the percher sends for the dyer later on to complain we trust he will be able to uphold his end of the argument by the help of the few points just given.

AZO DYES FROM CONIFEROUS RESINS

In British Patent 173,254, of July 22, 1920, R. Arnot describes the manner in which resins obtained from coniferae, when treated with fuming nitric acid, are nitrated and oxidized from hydroaromatic to aromatic compounds. The nitro-compounds formed are readily reduced to amines which yield azo dyes when diazotized and coupled with suitable components. Alternatively, abietic acid may be sulphonated and the product coupled with diazonium compounds to form azo dyes. The distillation of colophony with lime yields a phenolic oil, which on nitration and reduction is converted into amines suitable for the preparation of azo dyes. The preparation of a number of azo dyes of a variety of shades is described.—F. M. R., through "Jour. Soc. Dyers & Colourists."

A recent dispatch from London states that a Manchester firm of dyers has announced a process for dyeing more than one shade at a single dipping. The process is said to depend on the selecting absorption of dyes by fabrics made from mixed fibers.

Proceedings of the American Association of Textile Chemists and Colorists

The American Association of Textile Chemists and Colorists

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WALTER M. SCOTT

SEVENTH COUNCIL MEETING

The seventh Council Meeting of the American Association of Textile Chemists and Colorists was held at the Engineer's Club, Boston, Mass., on Friday, May 12, 1922.

The following members were in attendance: L. A. Olney, William D. Livermore, William H. Cady, George A. Moran, A. E. Hirst, W. M. Scott, Winthrop C. Durfee and W. E. Hadley.

The following members were admitted into the Association, by vote of the Council:

Active Membership

Alpers, George H., 122 Hudson Street, New York City.
Colorist, H. A. Metz & Co.

Archer, B. K., 330 North Sixth Street, Camden, N. J.
Salesman and Demonstrator.

Hayes, George A., P. O. Box 1069, Riverpoint, R. I.
Bleacher, Dyer, Finisher, Phenix Lace Mills.

Kenney, James E., 84 School Street, Charlestown, Mass.
Colorist, United Indigo & Chemical Company.

Lane, M. J., 220 Allyn Terrace, Lawrence, Mass.
Demonstrator, John Campbell & Co.

Lorimer, Walter H., Ontario and Lawrence Streets, Philadelphia, Pa.
Textile Chemist.

Purcell, James, 147 Main Street, Southbridge, Mass.
Chemist, Southbridge Printing Company.

Wall, William J., Nicetown Dye Works, Westmoreland and C Streets, Philadelphia, Pa.
President, Nicetown Dye Works.

Junior Membership

Beasley, D. D., 38 South Avenue, Wappinger's Falls, N. Y.
Chemist, Dutchess Bleachery.

Lawton, H. F., 19 Grove Street, Pawtucket, R. I.
Bleach House, Second Hand, U. S. Finishing Co.

Purris, George I., 130 Oliver Street, Boston, Mass.
Colorist, H. A. Metz & Co.

Russell, William W., 651 Warren Avenue, East Providence, R. I.
Textile Chemist, Sayles Finishing Plants.

Steele, E. V., 3 Elm Place, Marblehead, Mass.
Student, Lowell Textile School.

Washburn, J. M., 66 Pine Street, Lowell, Mass.
Demonstrator, National Aniline & Chemical Co.

Respectfully submitted,
W. E. HADLEY, Secretary.

SIXTH RESEARCH COMMITTEE MEETING

The sixth meeting of the Research Committee of the American Association of Textile Chemists and Colorists was held in the Engineer's Club, Boston, Mass., Friday afternoon, May 12, 1922.

The following members were in attendance: L. A. Olney, William D. Livermore, William H. Cady, George A. Moran, A. E. Hirst, W. M. Scott, Winthrop C. Durfee, William R. Moorhouse, W. J. Murray and W. E. Hadley.

The complete outline of the paper prepared on "Fastness of Dyed Silk to Washing, Scouring and Fulling" was discussed by the Research Committee, same having been prepared by the Special Committee in charge of Dr. W. M. Scott. This paper, in accordance with the general procedure, is to be published in full, as a provisional method, and after same has been subjected to criticism, and any needed alterations, will be considered as standard for this type of work.

The report of the special subcommittee on "Fastness of Cotton Material to Scouring and Washing" in charge of George A. Moran reported progress, and the method will be published in the near future.

Provisional Method on Fastness of Dyed Silk to Washing, Scouring and Fulling

The following revised provisional method on "Fastness of Dyed Silk to Washing, Scouring and Fulling" is published by Walter M. Scott, Chairman of the Subcommittee of the Research Committee which was appointed for this purpose.

In submitting this report the Research Committee wishes it definitely understood that it is provisional and is open for suggestions or discussions on the part of the members of the Association, or any others who may be especially interested.

This method will not be adopted as an official method until sufficient time has elapsed to give everyone an opportunity to make any criticisms or suggestions that may be necessary for its improvement, and with this in mind the Research Committee specially invites such comment.

Washing Tests

Directions for Testing

On Skeins.—Take about a five-inch length of the dyed silk skein, divide it in three parts, and add to each part an equal amount of undyed silk, wool and cotton, respectively, then weave into a braid. Heat the soap solution to the designated temperature, then immerse the braid for two minutes. Remove the braid from the solution, pass it through a wringer, and then return to the soap solution again. Repeat this process until there have been five immersions in the soap of two minutes each, followed by a passage through the wringer. At the end, rinse the braid in cold water, extract and dry. Note staining of wool, cotton or white silk, also loss in shade of the dyed silk.

On Pieces.—For this test use a piece about four inches square and duplicate the procedure described above. If so desired, the colored piece may be wrapped around a piece of plain white silk. Note change in shade and also staining of the adjacent white fabric, if it is present.

Specifications for Solution and Temperature

Test No. 1—Soap Solution (1%) at boil.
Test No. 2—Soap Solution (1%) at 160° F. (70° C.).
Test No. 3—Soap Solution (1%) at 120° F. (50° C.).
Test No. 4—Soap Solution (1%) at 85° F. (30° C.).
Test No. 5—Equal volumes of Soap Solution (1%) and Salt Solution (1%) at 85° F.

The soap used is the best grade of neutral tallow chip, such as Lux or Ivory flakes.

Fulling Test

Similar to that given for wool.

Take 2½ grams of the dyed yarn and braid it with smaller amounts of white silk, cotton and wool in such a way that the dyed silk makes good contact with the three undyed fibers. The weight of the dyed silk must be at least equal to the combined weight of the undyed material.

The solution for the test contains 5 grams of white neutral soap and 2 grams of Soda Ash per liter. Soak the braided sample in 150 c.c. of the above solution for sixteen hours at room temperature. Then heat in water bath to 140 deg. Fahr. (60 deg. Cent.). Remove from the bath and mill briskly on a scrubbing board until the wool is thoroughly felted. Rinse, dry and unravel for examination. The test so made compares fairly well with a two-hour mill fulling.

Classification of Colors

Note.—In listing the standards for each group, the original name and Schultz number are given wherever possible. [Those colors which are made in this country of satisfactory quality and quantity are indicated by a star.]

Class 1—Colors fast to test No. 1 without change in shade. Cotton, wool and silk are unstained.

Standards— Vat Dye.
*2% Indigo MLB4B Powder No. 881.
Sulphur Dye.
*5% Immedial Indogene GCL.
Chrome Dye.
2% Erio Chrome Azurol B No. 551—after chromed.
*Aniline Black—oxidation of aniline hydrochloride.

[1]Note.—Logwood black when properly dyed on an iron mordant shows no change of shade in test No. 1, but is not included among the standards because it stains cotton appreciably and silk slightly.

Class 2—Colors fast to test No. 2 without change in shade. Wool is unstained; cotton and silk slightly.

Standards—*10% Primuline No. 616—developed with beta-naphthol.
*12% Zambesi Black V—developed with meta-toluylene diamine.

Class 3—Colors fast to test No. 3 without change in shade. Cotton and silk slightly stained; wool even less.

Standards— Dyed with acetic acid.
*1% Victoria Blue B No. 559.
*1% Brilliant Green Crystals No. 499.

Class 4—Colors fast to test No. 4 without change in shade. Wool is unstained; cotton and silk slightly.

Standards— Dyed with sulphuric acid and boil-off liquor.
*2% Formyl Violet S4B No. 530.
*2% Patent Blue A No. 545.
Dyed with Glauber's Salt and Acetic Acid.
*2% Diamine Green B No. 474.
2% Diamine Fast Blue FFB.
*2% Chrysophenine G No. 304.

Class 5—Colors fast to test No. 5 without change in shade. Wool is slightly stained; cotton and silk a greater degree.

Standards—Dyed with sulphuric acid either with or without boil-off liquor.
*2% Fast Red A No. 161.
*2% Patent Blue V No. 543.

Class 6—Colors which change shade even in test No. 5 and stain cotton, wool and silk to a large degree.

Standards— Dyed with Sulphuric Acid.
*5% Indigotine No. 877.
*2% Acid Magenta No. 524.
*2% Alizarine Sapphirole B No. 858.
*2% Orange II No. 145.

Washing—For practical purposes, the colors in the first four classes are perfectly acceptable in solid shades when the washing directions of the Laundry Owners' National Association for silk are followed. They may be washed with similar success in the home by following the instructions given in connection with Lux or Ivory Soap flakes.

Classes 1 and 2 are particularly satisfactory for use on embroidery silks and all types of colored silk stripes used in connection with a white ground which are liable to be subjected to a more severe washing.

Solid color fabrics dyed with Class 5 colors may be washed at room temperature if extreme care is used. A small percentage of common salt in the solution will help to hold the color.

Class 6 colors are only suitable for goods where no washing is expected. Fabrics dyed with these colors must be dry cleaned.

Fulling (see foot-note) *Class 1—Colors in this group are fast to four or more hours' ordinary fulling without noticeable change in shade or staining of cotton, wool and silk.

Class 2—Colors in this group are fast to two or more hours' ordinary fulling without noticeable change in shade. Wool is unstained; cotton and silk slightly.

Class 3—Colors in this group will stand two hours' fulling with only very slight loss in shade and staining of wool, silk and cotton.

Class 4—Colors in this group show a more noticeable loss in shade in the course of two hours' fulling and stain cotton and silk in varying degrees. Wool is, however, either unstained or very slightly so.

Classes 5 and 6—The colors in these two groups are unsuitable for use where the dyed silk is expected to undergo any fulling operation.

*The Committee is indebted to Mr. Livermore, of the American Woolen Company, for practical fulling tests, as a result of which the above classifications were arrived at.

CHANGES OF ADDRESS

The following changes and corrections in names and addresses of members should be noted:

William H. Cady,
127 Power Street,
Providence, R. I.

Walter F. Hamlin, Jr.,
128 South Front Street,
Philadelphia, Pa.

L. N. Hood,
159 High Street,
South Manchester, Conn.

NOTICE FROM THE SECRETARY

Applications for Membership in the American Association of Textile Chemists and Colorists

All individuals who believe they are eligible for membership in the Association and are desirous of affiliating with the organization can communicate with the Secretary, who will gladly furnish application blanks and extend to them every possible assistance.

It is desirable that members of the Association should make an effort to interest all those who they believe would make desirable members.

The Secretary will at all times be pleased to provide members with as many application blanks as may be desired.

W. E. Hadley, Secretary,
5 Mountain Avenue, Maplewood, N. J.

ELECTROMETRIC TITRATION as a MEANS OF DETERMINING THE FREE SODIUM SULPHIDE IN A SULPHUR BLACK DYE BATH

By W. Walker Russell
with Samuel T. Arnold

(*Continued from last issue.*)

Iodine, however, has the disadvantage that it must be used either in acid, or in neutral solution, and acid results in the precipitation of the dye, as well as the liberation of the sulphide ion as hydrogen sulphide.

Preliminary experiments showed that the dye may be precipitated from solution in a more or less reduced condition, by acid, and this precipitate is subject to oxidation by the iodine reagent. It is this side reaction, between the dyestuff and the iodine, which necessitates the precipitation of the dye in Len's method, and the distillation of evolved hydrogen sulphide in the method of Swann. To eliminate or to control this side reaction proved to be the main problem in the work.

From the first a serious difficulty was involved in obtaining like samples for use in duplicate titrations. The sulphur dye bath, especially, in the freshly reduced condition, is oxidized only too readily by any contact with the air, and unless especial precautions are taken, this fact alone will prevent any sort of check titrations. There is no special difficulty involved in the volumetric estimation of the sulphide alone by means of iodine,[6] but with a sulphur dye dissolved in the sulphide, determination of the sulphide ion is increasingly difficult.

The following titrations serve to show the ease with which a sulphur dye bath oxidizes when freshly reduced. The dyestuff was freed from any sulphide it may originally have contained by treatment with acetic acid which was neutralized before making up the bath with a given amount of sodium sulphide. The volumetric flasks containing the dye baths were kept tightly stoppered, and the dye baths were exposed to the outside air only during the removal of the sample with a pipette.

BATH A

No.	Date	Sample	Amount of N/10 Iodine	Grams of $Na_2S.9H_2O$
1	May 19	15 cc.	15.47 cc.	0.1858
2	May 21	15 cc.	14.62 cc.	0.1756
3	May 21	15 cc.	12.74 cc.	0.1529
4	May 24	15 cc.	8.38 cc.	0.1006

BATH B

5	May 21	15 cc.	14.44 cc.	0.1734
6	May 24	15 cc.	13.50 cc.	0.1621
7	May 24	15 cc.	12.49 cc.	0.1499
8	May 24	15 cc.	11.03 cc.	0.1324

Note—The above results represent in each group the successive titrations of a single bath, when on the same day the titrations were spaced about one hour apart. Comparisons of numbers 2 and 3 of Bath A, and of 6, 7 and 8 of Bath B, show clearly the error introduced by the sampling of the same bath with only ordinary precautions. This sensitiveness of the freshly reduced dye bath to oxidation makes it necessary, at this stage, to avoid all operations, such as precipitating the dyestuff from solution, filtering it off, or of in any way exposing it to the air.

[6] M. Tschilikin, Anal. Chem., 48:456.

There are two factors to be considered in determining the amount of iodine which takes part in the side reaction, with the precipitated dyestuff, as already referred to. First, the amount of acidified standard iodine solution to which a given amount of dye bath is added, and second, the time which is allowed for the two to interact. In the following titrations the same amount of dye bath was added to differing amounts of standard iodine solution. The determinations were carried out in sets of two, the samples being removed in rapid succession and immediately added to an excess of acidified iodine. In each case the second sample stood in contact with the iodine while the first was being titrated.

	Sample	Excess of Acidified N/10 Iodine to Which Sample Was Added	CC. of N/10 Iodine Required
1	15 cc.	20 cc.	12.57 cc.
	15 cc.	25 cc.	13.20 cc.
2	15 cc.	25 cc.	16.42 cc.
	15 cc.	20 cc.	16.07 cc.
3	15 cc.	29 cc.	16.24 cc.
	15 cc.	20 cc.	15.52 cc.
4	15 cc.	28 cc.	20.86 cc.
	15 cc.	20 cc.	18.23 cc.

It was, at last, decided to control rather than try to eliminate the oxidation of the precipitated dye, by allowing the iodine to react only for a given time, and then adding an excess of standard thiosulphate, the idea being that sufficient time be given for the iodine to react with the free sulphide present, but not enough allowed for the iodine to attack the dyestuff itself to any appreciable extent. The method which was finally worked out makes use of this scheme, and is given fully, as its success, if duplicate check determinations are desired, depends on attention to details, especially in the case of a newly reduced bath.

A sufficient quantity of the dye bath to be analyzed is best obtained in a stoppered bottle from which smaller samples may be taken. The procedure for two samples is as follows:

To each of two liter beakers containing about 700 cc. of water and 10 cc. of 1 to 3 hydrochloric acid add about 70 cc. of N/10 iodine[7] from a 100-cc. burette. Stir thoroughly to hix the acid and iodine. Two 50cc. pipettes, each topped with a short piece of rubber tubing containing a solid glass bead, are used to remove the samples. By means of the tubing and the beads the pipettes can stand full of liquid. Each pipette is filled from the bottle as rapidly as possible, the liquid being drawn well up above the mark.

[7] Iodine in excess of the amount actually required by the sulphide must be added here.

(To be concluded.)

Extraction of Oils and Soap from Thrown Silk

Effects of Solvents upon the Unsoaked Raw Silk—Effect on Soaked Silk—Extent of Extraction of Oil and Soap—Losses of Silk Substance Otherwise Unaccounted for—the Time Factor Important—Care in Sampling

By H. S. MUDGE

IT is very important for all persons concerned to know whether analyses reported as "oil extract" or "ether extract"—ordinarily identical terms—represent the true percentage of material on the silk, due to the soaking operation.

Whatever the method of soaking used, whether merely oil spraying, soaking in an emulsion of soap and oil, the use of sulphonated oils, or any operation in which a fatty oil, and occasionally a mineral oil, may be deposited upon raw silk, or if present for any reason upon dyed or finished silk, a solution and method of extraction must fulfill certain requirements.

In our review of this problem we have had to consider the following points:

1. Effect of solvents upon the unsoaked, raw silk.
2. Effects of solvents upon the soaked silk.
3. Whether all the oil and soap is dissolved—i. e., extracted.

Effects of Common Organic Solvents

To determine the effect of the different common organic solvents on raw silk, they were tried in the usual solvent apparatus on three of the common grades of raw silk—Japan soft-natured silk, the harder gummed Canton, and yellow Japan. The results determined were as shown in Table I, where the solvents are arranged in order of boiling points. The amount extracted in each case was dried at 100 to 150 deg. Cent., two determinations being made for each grade. Also the number of syphonings. The results are expressed in percentage, calculated on a bone-dry basis of the raw silk.

TABLE I

	Japan Soft Gum		Canton Hard Gum		Yellow Japan	
1. Sulphuric ether, U. S. P.	0.45	0.53	0.34	0.38	0.27	0.37
2. Petrolic ether, redist. 40 to 90 deg. Cent.	0.39	0.61	0.22	0.18	0.18	0.13
3. Carbon disulphide C. P.	0.18	0.43	0.24	0.32	0.30	0.21
4. Acetone C. P.	0.30	0.56	0.29	0.22	0.29	0.37
5. Chloroform C. P.	0.40	0.69	0.40	0.36	0.83	0.53
6. Refined methyl-alcohol 97 per cent.	0.77	2.14	0.66	0.82	1.09	1.33
7. Carbon tetrachloride C. P.	0.31	0.64	0.37	0.35	1.00	0.41
8. Ethyl-alcohol U. S. P. 96 per cent.	1.60	1.98	0.57	0.83	0.87	1.35
9. Benzol C. P.	0.31	0.60	0.26	0.48	0.64	0.39
Number of syphonings..	10	20	10	20	10	20

Several very interesting observations were made during the analysis and upon the results. It will be noticed that the extracts from methyl-alcohol and ethyl-alcohol are the highest in every case. Also that they are noticeably higher in every case of longer extraction, when twenty syphonings were made instead of ten.

Again, on the soft gummed Japan silk every case shows a higher result for twenty syphonings than for ten, and that for sulphuric ether is the only one in which twenty syphonings are not more nearly double than equal to that for ten. This we believe to be due to the soft nature of the gum. Again, this time of extraction does not have so noticeable an effect upon the hard gummed Canton or yellow Japan grades.

We used the common market C. P. grades of solvent, and have considerable reason to believe that this also makes a difference, as it was necessary to redistill several of these solvents and slightly foreign odors were present. For instance, our ethyl-alcohol and methyl-alcohol, "C. P. acetone free," contained each more than appreciable residues, and that of the other solvents was sufficient to affect the results. Also, about 5 per cent benzol was separated from the "C. P. acetone free" methyl-alcohol, possibly due to its source of preparation.

Amphoteric Nature of Silk

Another factor is the decided amphoteric nature of silk; its affinity for bodies slightly acid, as well as slightly basic. Not only are there such bodies present in sufficient quantity in these solvents to affect the results slightly, but in the case of chloroform, methyl-alcohol and ethyl-alcohol, and in carbon tetrachloride, there are changes worthy of notice. It will be noticed that all of these last show somewhat higher results than the others. Moreover, some very interesting results were obtained on mixtures of certain solvents, including these. Chloroform is known to be unstable, and is stated to be preserved by the presence of 1 per cent ethyl-alcohol. Also,

the two alcohols readily oxidize to the corresponding aldehydes and become acid easily. It seems to us that these results indicate the undesirability of these solvents (chloroform, carbon tetrachloride mixtures), for the most accurate work, and also in order to get back silk most nearly in the original condition. The extraction may be complete and the amount weighed approximately correct, but greater accuracy and practically no alteration of, nor deposit upon, the silk fiber will occur with the proper choice of solvent, such as one properly purified, or a non-alcohol or non-chlorinated solvent, which has first been redistilled from silk itself. The alcohols, of course, cannot be used as solvents alone, since the fats and oils do not dissolve in them sufficiently. A little added to an inefficient solvent of oils will greatly increase the solubility of any soap present, however.

Sulphur Content of Soap or Oil Remaining in Soaked Silk

The amount of soap or oil containing the sulphur group of sulphonation which is left on the fiber after soaking, we are prepared to show, is very small, both in proportion to the amount present in the original soaking liquor and in proportion to the oil present. This applies to any silk soaked anywhere near the scientific proportions now used by up-to-date technically trained throwsters. It is very true that a great many concerns to-day simply slap in several pounds of oil and soap in excessive amounts and in proportions which have acquired some mysterious sanction.

The alcohols, when used alone, react very slightly upon silk, probably due to the oxidation referred to, since a large portion of this extract is of a saponifiable nature, has the odor of a cooking cereal, and contains up to 0.17 per cent gum, as calculated from a Kjeldahl nitrogen determination. Upon mixing a halogenated organic liquid, such as chloroform, carbon tetrachloride, trichloroethylene or tetrachloroethane, with an alcohol—such as methyl, ethyl or amyl alcohol—in various proportions from one-quarter to three-quarters, and upon simple distillation of the solvent from the raw silk, the latter when dried to constant weight at 105 deg. Cent., or at 140 deg. Cent., was found to have gained from 7 to 18 per cent in weight. This gain in weight takes place upon either the sericin or fibroin, and will be removed by the boil-off operation and can be redeposited and again boiled off from the fiber, the operation leaving nearly, but not quite, the original weight of silk.

A specimen with this deposit was found to contain 0.52 per cent chlorine. We have not yet determined the nature of this union, for such it appears to be, though loosely bound, and yet apparently not a simple absorption or mechanical deposit. It may involve a combination similar to those theoretically, and proved to take place during dyeing, and yet it may be a readily reversible chemical reaction taking in the (–CO– N H–) group of silk.

At present we are simply experimenting with the solvent action on silk, and not studying this reaction. The material extracted was found to have an appreciable saponification value. An exact figure has not been obtained, on account of normal variations in silk and impurities in the solvents. We can remove such of these impurities as react on silk, to a great extent, by distilling them off silk itself. Those smaller residues from extraction with acetone and with sulphuric ether, in the table, we found free from essential silk substance—that is, containing no appreciable amounts of nitrogen. Further on in this article we have listed a table showing the weights of recovered silk, after extraction, indicating remarkable changes.

The slight variations noted in these determinations must be laid to the natural variation in composition of all animal secretions and excretions, and of living products in general, for duplicate tests do not agree precisely.

Effect of Extraction of Soaked Silk

Now we must consider the effect, applying directly and especially to determinations for the trade, of extraction of silk which has been soaked, and generally after it has been thrown. This determination on thrown silk involves the removal of soap of all kinds possible, whether from hard stock, mixed, medium and soft, or from pure soft stock—i. e., from tallow, tallow and cottonseed, or palm-oil and cocoanut-oil mixtures, neatsfoot, lard or olive oils, foots, etc.; all oils which may be present—mineral or fatty, animal or vegetable, and also sulphonated oils of whatever variety; neatsfoot, cocoanut, possibly castor and certain hydrogenated and deodorized oils, such as fish oils, which may have been procured cheaply, and worked up. The use of these oils is not always based on technical and scientific reasons, but upon market price.

In considering the solubility problems involved, as the oil and soap lie on the silk, the most important points are the choice either of a solvent, a mixture of solvents, or successive extraction with two different solvents, in order to remove all the foreign material. It is clear that this opens up a wide field of possibilities, when the matter is brought down to small fractions of 1 per cent. In fact, a claim for accuracy within 0.50 per cent and less would require a sample of unsoaked silk and of the soaking liquor also. This is obvious from the variation in the extract obtained on silks of known origin. In the soaking liquor as used, soap reaches practically its complete disassociation, and physical chemists state it passes from the colloid to the electrolyte phase and has the unique property of lowering surface tension greatly. This is the theoretical ground for its penetrating and detergent power, in spite of the fact that many textbooks and teachers still cling to the old idea of a dissociated molecule as the only explanation.

Analyses of Soaking Liquors

In attempting to reach the greatest accuracy we have

to consider how much of this extract noted in the table is removed along with soap and oil. This silk-wax may run from 0.2 to 0.6 per cent. If we consider 0.4 per cent as an average and the oil extract found as 3.5 per cent, for instance, then one-tenth of that will be silk-wax, for we have not found that it is largely left in the soaking liquor.

The soaking liquor is not simply in the condition which we would expect when the oil has been removed by the silk. It will appear cloudier than before, and will show a considerable proportion of wax-like material, which is apparently a trace of gum. A few hundreds of 1 per cent is enough to cloud it. The soaking operation is understood to be not one of penetration to the extent of loosening hard gums, but only sufficient to soften them. We have made analyses of the extracted oil and found it free from nitrogen. We also find it much higher in unsaponifiable matter than any of the original materials. Also, we have observed that silk will tend to purify and clarify inert neutral liquids, and it is quite likely that the different waxes in the soap and oil and silk become concentrated in this oil-extract.

There are also the very small percentages of other substances, such as oxidized fat and soap, especially from sulphonated oils, and sulphonic salts. As for these, we know that a very large proportion of all materials not soluble in water is deposited on the silk, and very little of the water-soluble part goes on the silk.

Our analyses on this may be summarized as follows, without giving further figures:

Eighty to ninety per cent of an ordinary fatty oil present in the soaking bath is removed by the silk.

Ten per cent of the soap remains on the silk, by far the larger portion remaining in the bath.

Finally, 80 per cent of the sulphur-bearing fat of sulphonated oils remains in the bath, as well as any soluble salts present from any source.

Losses of Silk Substance Otherwise Unaccounted For

The last question which we took up was whether there is any loss of silk substance unaccounted for by an unexplained removal of non-nitrogenous substances from silk, which contains 17 to 18 per cent nitrogen closely bound in each molecular group. As stated above, only the higher percentages of organic solvent extracts were found to contain nitrogen, and no nitrogen was found in the oil extracts. The unexpected reaction of silk with the chlorinated and alcoholic mixtures shows that an addition of a non-nitrogenous group not volatile at 140 deg. Cent. is formed. However, this remains out of the extract on account of being united with the silk itself, being capable of removal by the boiling-off operation with slight apparent effect on the silk from the standpoint of this work we are now doing. To obtain such results showing alteration in the weights of recovered silk, we compiled a series of tests on the amount of silk recovered from the extraction of raw silk, without soaking. Three-quarters of the results show a gain in weight as shown by Table II. The figures are in percentages calculated to the bone-dry weight of original raw silk. One-fourth of the results show a loss in weight, notably in the chlorinated and alcohol solvents. These are indicated by the minus sign following the figure in the table.

TABLE II

	Japan Soft	Canton Hard	Yellow Japan	
1. Sulphuric ether U. S. P.	0.48	0.35	0.60	1.00
2. Petrolic ether redist. 40 to 80 deg. Cent.....	0.49	0.05	0.01	0.30—
3. Carbon disulphide C. P.	0.22	0.26	(Lost)	0.11
4. Acetone C. P.....	0.58	0.90	0.04	0.44
5. Chloroform C. P.....	6.66	3.00	10.20	5.43
6. Methyl-alcohol 97 per cent	0.08	0.14	0.48—	7.90
7. Carbon tetrachloride ..	0.23	0.49	0.17—	0.18—
8. Ethyl-alcohol U. S. P. 96 per cent.....	0.76	0.19—	0.29	1.70
9. Benzol C. P.....	0.02	0.35	0.60—	0.31
Number of syphonings....	20	20	10	20

Each of these solvents reacts neutral in a water mixture with methyl orange and phenolphthalein indicator both before and after extraction and recovering of the solvent, or has only a small trace of acidity.

These changes in weight do not appear to affect the amount of extract within the comparatively short time required to extract all the oil present. As stated above, they may be explained by secondary reactions on the silk. The solvents are all the usual C. P. grade, and we have not tried especially purified solvents.

It is desirable to note that the extremely hygroscopic nature of silk makes it imperative to keep it thoroughly protected from the air during cooling and weighing. A weighing bottle and a fresh desiccator or similar means are essential. Bone-dry silk will gain 0.1 per cent in moisture in ordinary air in a very few seconds.

Degree of Soap and Oil Extraction Perfected

Question 3, as to whether all the soap and oil is extracted by the solvents named in the table, exclusive of the alcohols: Practically all the oil is removed, together with silk-wax, and the greater part of a sulphonated oil will be removed, but the mineral salts, oxidized and dry, saturated soda soap, some of these, although constituting only a very small percentage of the original amount, will be partially left behind. The addition of a small proportion of redistilled C. P. methyl-alcohol to one of these solvents will considerably increase the solubility of ordinary soap and of sulphonated oil. Either acetone or petrolic ether three parts to one of methyl-alcohol has worked well here. The thorough extraction effected by

a Soxhlet apparatus will enable acetone alone to extract nearly all of the deposited oil, soap and sulphur groups, this dissolving them much more readily than petrolic ether, which is also more inflammable; however, the addition of a little alcohol insures this solution. Sulphuric ether and carbon disulphide have no marked advantages over the others, and are so extremely inflammable that their continual use is likely to result in a fire occasionally if used for routine extraction. A trial made with these shows them to be much more inflammable even than petrolic ether.

The Time Factor

The time involved to make an extraction for commercial purposes makes some difference also. Outside of the chlorinated solvents and the alcohols (which, alone, would not extract the oils), benzol has a sufficiently higher boiling point than acetone to extend the time required for extraction and for drying considerably, and also gives a darker colored extract.

Then we tried adding a little water to the solvent, possibly increasing the solubility of the sulphonated oils. As noted above, the water-soluble portion of these oils largely remains in the water during thorough soaking. Occasionally we have had a skein for extraction which seemed to have been soaked in such a way as to retain more than usual of this part of the oil. While the other solvents continue to extract the oils in the presence of water, practically as thoroughly as before, the total amount dissolved does not appear to be increased by adding water. There is, in every case, a very small portion remaining, and we believe this is more than canceled by the small amount of silk-wax dissolved; under usual conditions it is negligible.

As to the amount of silk removed by mixed solvents, such as acetone plus some methyl-alcohol, it appears to be very close to the amount proportional in Table I for equal time. Prolonged extraction we have shown to slightly affect the silk substance.

In all ordinary cases seven or eight syphonings are about right. We do not believe it is advisable to set up the apparatus and let it run for a long time to insure complete extraction.

A curious fact with regard to the odor left by the solvent is that in three totally different series of extractions, when the silk had been extracted and dried to constant weight and duplicate weighings made at 135 deg. Cent., on moistening this silk with water the odor of the solvent used could be detected. This was especially noticeable in the case of acetone, and somewhat for chloroform and ethyl-alcohol, less so for benzol. It is well known that the odor of many substances is due to traces of impurities. Silk seems to remove some of these, and perhaps retain some of the solvent also.

It is also well known that gases have extremely high surface absorption, even at high temperature. For instance, the complete removal of air and other gases from vacuum apparatus is difficult.

Care in Sampling Is Imperative

Finally, we urge the greatest care and judgment in the sampling of silk to be extracted. We have found notable variations in the amounts of oil on successive windings from the same cop, bobbin or skein. Skeins soaked side by side in the same bath will take up different amounts of oil. That part of the silk which first enters the bath will take up the most oil. Being largely a surface condition, the oil will concentrate or distribute itself at different points. The number of samples for extraction should be proportional to the importance of the case, and especially if only one sample is taken it should be as thoroughly representative as possible.—"Silk."

"FIBRE & FABRIC" IN NEW QUARTERS

Our contemporary "Fibre and Fabric" announces the removal since May 1 of its former office, 127 Federal Street, Boston, Mass., to 465-475 Main Street, Cambridge 39, that city, where members of the staff will in future be glad to welcome all callers as before.

ATLANTIC ADDS H. C. BROWN TO SALES FORCE

H. G. Brown, of Philadelphia, Pa., has joined the sales force of the Atlantic Dyestuff Company and will visit the trade through eastern Pennsylvania and southern New Jersey territory. Mr. Brown is a graduate of the Philadelphia Textile School and has covered the textile trade for the past ten years representing the Hyde, Rakestraw Company and the Turner-Halsery Company. Through his past experience he is well fitted for both technical and sales duties in his present capacity.

BUTTERWORTH-JUDSON CORP. IN RECEIVER'S HANDS

Thomas G. Haight and Henry G. Atha, of Newark, N. J., and James O'Brady, of New York City, the latter president of the Butterworth-Judson Corporation of New York, have been appointed receivers of the Butterworth-Judson Corporation in the United States District Court by Judge Hand.

The corporation, which is capitalized at $2,500,000, has its plant at Newark Bay. It was said to have turned out during the war 95 per cent of all the picric acid used by the Allies. Since that time it has been turning out commercial chemicals, but at a decreased volume.

The chief complaining creditor, the Hay Foundry & Iron Works, Newark, with a claim of $18,000, is represented by Breed, Abbott & Morgan. The other creditors are represented by Rushmore, Bisbee & Stern. The corporation is represented by Chadbourne, Abbott & Wallace. It was said in court that the corporation's assets were believed to equal or exceed its liabilities, that it had been conservatively managed, and that its affairs had been found to be in good order, but reduced business made an adjustment and accounting necessary.

Testing and Standardizing Dyes

The Model Dyehouse—Taking Samples—Various Recommended Processes—Chrome Colors—Examination of Dyeings

By E. GREENHALGH

IN the manufacture of coal-tar colors it is often found that variations of shade and strength occur between subsequent successive lots of one color; in fact, one lot may be of a high strength, while the succeeding one may be only 75 per cent as strong. A variation of shade may result from two consecutive productions, one being reddish in tone, while the other appears, when dyed, to possess a greenish or grayish cast. It is obvious that colors cannot be delivered to the user indiscriminately, and that every lot of color should conform with a recognized standard in strength, shade, tone, and other properties before delivery to the user.

The Model Dyehouse

This work of standardization is carried on in the works dyehouse in miniature, thus giving facilities of making bulk mixings on a large scale in another portion of the works, where the color can be ground to a fine powder and mixed with other ingredients so that the resultant color will exhibit similar properties to the required standard.

Before proceeding to the actual testing and standardizing methods used for coal-tar colors it is advisable that some idea be conveyed as to the plant of an experimental dyehouse. The apparatus should consist of several dye baths of various styles; for instance, there should be at least two or three large baths containing calcium chloride, sodium nitrate, salt or other substance tending to produce a higher boiling point, while quite a reasonable number of air baths and ordinary water baths should always be available. These baths should each have a cover containing holes large enough to contain and hold the dye pots.

The dye pots should be of porcelain or thick glass of a special nature, and should be of various sizes, according to the bulk of material to be dyed; there should be present in every dyehouse porcelain or thick glass beakers capable of holding anything from 100 c.c. to 1 liter. Stout glass rods varying from three-eighths to five-eighths of an inch thick and of twelve to fourteen inches long, turning to the fabric in the dye liquor. As in nearly every case of dye testing it is necessary to make a solution of the color, a good balance, sensitive to 0.01 grain, and several flat bottomed flasks of all sizes are necessities, and a good range of measuring cylinders should be provided. The flasks containing the dye solutions need to stand boiling, either on a wire gauze or a hot plate. Other pieces of apparatus, such as pipettes, a few burettes, funnels, casseroles, watch glasses, etc., also find use in the dyehouse equipment.

After dyeing a fabric it is necessary to dry it, and for this purpose a small hydro-extractor, or a mangle having rubber rollers should be placed in a convenient position near the drying stove, so that, after eliminating a good portion of the excess water, the goods can be dried right away. The drying stove should be heated by a steam coil and well ventilated, care being taken that no drops of water are allowed to form inside. Precautions should be taken to prevent the rise of temperature above a certain limit (180 to 200 deg. Fahr.). In most up-to-date dyehouses there is always a daylight lamp, by which shades can be examined in dark weather or at night time.

Textile fabrics can be obtained from manufacturers in convenient lengths or weights, and where yarns are to be used hanks of 75 to 150 grains should be procured, thus saving time in winding. In the case of cloth, this is best obtained in the piece and cut to the the required size. The actual state of the dyes should be noted, including the fineness of the powder, the size and perfectness of the crystals, and whether damp or overdry.

Taking Samples

In taking samples of color it is advisable to draw two or three from different parts and subsequently mix these by hand in a mortar. This should be done particularly where other products have been added to bring the color up to strength or shade. The sample should now be weighed out, in duplicate, against its required type, and carefully transferred to a measured flask or other convenient vessel, there to be made up to a given volume with distilled water at 60 deg. Fahr.

This liquor, after careful agitation, is transferred to a flask, and the temperature raised to the boil on a wire gauze or hot plate, the flask being removed as soon as boiling commences. The solution of the dyestuff should be compared with the type and any differences noted.

Each sample to be dyed should be brought to a given weight. The required amount of dyestuff is now pipetted into a dye pot and water of a required temperature added to make a given volume. The fabrics, either wet or dry, as occasion requires, are now en-

tered, and dyeing is carried on according to instruction. After the dyeing is completed the goods are washed, wrung and dried, and finally labeled up for examination.

Judging the shades should always be done in a north light, and no other light should be allowed to enter the room, as only by this means can accurate conclusions be reached. In every dyehouse there should be set apart an enclosure which receives only light from the north.

The first series of dyestuffs which will be considered are the acid colors. In every case a certain solution is made up, and for guidance in this matter it is recommended to produce a ½ per cent solution of the color by dissolving four parts by weight and making up to 800 parts and boiling. At this stage it is well to have all the samples balanced to a given weight, which, for the purpose of a reliable test, should be about 150 grains.

The Processes

Process 1.—Recommended for use in the cases of Croceins, Ponceaux, Acid Orange 11, and other brands, and other similar azo acid dyestuffs.

The dye bath is made up of 400 to 500 parts boiling water along with one-half part of 10 per cent solution of Glauber's salt. An addition of six parts of a 5 per cent solution of sulphuric acid is now made, and the woolen samples are immersed for five minutes. The goods are now raised, while the color solution is added, and in this case color enough to produce 2 per cent is usually taken. This represents a volume of parts of dye liquor for parts of material.

Dyeing is continued at the boil for fifteen to twenty minutes, when a further quantity of a 5 per cent vitriol is added, about two to four parts, and the process carried to the exhaustion of the dye bath, which in these cases should practically go water clear. In order to improve the tone and brightness of these dyeings it is well to stir the goods continually in the exhausted bath at the boil for at least fifteen minutes.

Process 2.—For colors such as the Phthaleins, Eosine, Kanthrosine and Carmoisine, Lanafuchsine, Azo Magenta and Violamine.

The dyeing is carried on in practically the same method as in Process 1 except that the dye bath is started with the following:

400–500 parts water at 160 deg. Fahr.
5–7 parts 10 per cent solution ammonium acetate.
2–3 parts 5 per cent solution sulphuric acid.

Dyeing is carried on as before.

Process 3.—For sensitive colors, particularly the dyes derived from the tetra-hydroxyanthraquinones. Alizarine Saphirol and Rubinol; also colors such as Naphthylamine Blacks, Acid Blacks and Naphthol Blue Black.

The dye bath is started with:

400–600 Parts water at 140 deg. Fahr.
3–4 parts 10 per cent ammonium acetate.
3–4 parts 5 per cent acetic acid.

The goods are wet out and the requisite amount of color solution either for 1 per cent (20 parts), 2 per cent (40 parts), or 4 per cent (80 parts) is added, and dyeing carried on till the bath is boiling. A further addition of three to four parts of 5 per cent acetic acid is now made, and dyeing continued at the boil for half an hour, when the bath should be near exhaustion. The dye baths are cooled down to 190 deg. Fahr., and an addition of two to four parts of 5 per cent sulphuric acid is made and dyeing recommenced and carried on at the boil until the baths are exhausted. The goods are taken out, well wrung, washed in both hot and then cold waters and dried.

Process 4.—For individual colors which are affected or unduly precipitated by vitriol, also for dyeing of chromed colors, which are destroyed by using bichromate along with vitriol.

The dye bath is made up with:

400–500 parts water at 175 to 190 deg. Fahr.
10–15 parts 10 per cent sodium sulphate, or
3–5 parts 10 per cent ammonium acetate.
5–6 parts 5 per cent acetic acid.

The goods are well wet out in this bath for five minutes, and the color solution added. Dyeing is carried on at the boil for fifteen to twenty minutes, when an addition of a further five to six parts of 5 per cent acetic acid is made, and dyeing continued until exhaustion. In the case of after-chromed colors it is advisable at this point to cool down the bath to 190 deg. Fahr. and add three to four parts of 5 per cent acetic acid and two and a half to three parts of 5 per cent bichromate of soda. The after-chroming is now carried on at the boil for thirty minutes.

Chrome Colors

In the case of certain chrome colors the color itself is partially insoluble and requires the aid of a small amount of alkali, such as ammonia or soda ash, to bring about perfect solution. Certain chrome colors have to be dyed by the use of vitriol, and Process 3, together with the additions mentioned above for after-chroming, will answer.

Process 5.—For the application of colors by the metachrome process. Examples of this class of color are the metachrome series and certain other colors requiring a mordant.

The dye bath is made up with:

400–500 parts water at 120 to 140 deg. Fahr.
1–2 parts 5 per cent ammonia.
4–5 parts 5 per cent Metachrome Mordant.
15–20 parts 10 per cent Glauber's salt.

The requisite amount of color solution for 2 per cent shade (40 parts) is now added, and the goods, previously wet out in boiling 1 per cent acetic acid and subsequently well squeezed, are entered. The temperature of the bath is raised sowly to the boil over a period of thirty minutes, and then continued at this temperature for a further forty-five to fifty minutes, when the bath should be exhausted. The color is simultaneously dyed on the fiber and chromed by the gradual decomposition of the metachrome mordant. Metachrome mordant acts precisely in the same way as reduced chrome mordant on wool.

Process 6 —Colors dyed on chrome mordanted wool, such as Alizarine Green and Blue Black.

The wool to be dyed is first mordanted by boiling for two to three hours in a bath containing:

2–3 per cent bichromate of soda.
3–4 per cent cream of tartar.

The dye bath is made up of 400 to 500 parts water at 140 deg Fahr. and the requisite amount of dye solution. The goods are entered and the temperature raised to the boil in about fifteen minutes, when an addition of two to three parts of 5 per cent acetic acid is made, and dyeing continued at the boil until the color has all gone onto the fiber.

Examination of Dyeings

This practically covers the whole field for the testing of colors on wool. Every difference between any color and its standard should be noted, and even if the sample exhibits better properties it should be made to conform with the standard. In the shading of colors it is advisable to use pure colors and not mixtures; a certain shade of red may need dulling. In this case use either a pure acid black like Naphthylamine Black or Naphthol Blue Black instead of an ordinary acid black, which may be a mixture of all kinds of colors, such as Orange 11, Metanil Yellow, with Naphthol Blue Black or other convenient base. In every case of shading make a mixing in solution in the dye house, then make a small mixing in powder, and if both mixings conform to standard proceed in like manner with the bulk stuff.

All color which cannot be made to standard, either in strength, shade, tone, etc., should be reported. In the reduction of all colors used for wool use Glauber's salt alone or together with a small quantity of dextrine, but never use common salt as this is sometimes undesirable.—"Dyer and Calico Printer."

Dyeing Worsted Piece Fabrics

Proper Scouring Essential to Good Work—Notes on Precautions in Scouring—Rinsing After Scouring—Temperature—Soft Water Eliminates Later Difficulties—Washing After Carbonizing—Handling of Goods in the Dye Bath—Unmentioned Changes in Manufacturer's Cloth Stock Make Matching Difficult—Obtaining Wide Range of Shades with Few Dyes—Working Suggestions

By LOUIS J. MATOS, Ph.D.
National Aniline & Chemical Company

FABRICS for women's wear, particularly in the light weights, are chiefly worsteds, and for their successful manufacture, outside of the strictly mechanical operations up to and including the weaving, considerable care and attention to some of the details are necessary.

The most important operation essential to good work is in the scouring of the cloth. Fabrics that have not been thoroughly scoured free and clean of the lubricating oils used on the wools, are likely to show distinct marks when they reach the finishing room. Cloth scouring involves the use of a good and practically odorless soap, a sufficient volume of scour liquor, and a more or less close regulation of temperature and time. The choice of soaps for the better class of goods depends much upon the skill and judgment of the workman who does the work; if he is accustomed to handle the better grades of fabrics, he will make use only of such soaps that dissolve readily and rinse out freely without leaving the peculiar and characteristic odor commonly found on many fabrics.

Precautions Necessary in Scouring

Regarding the volume of scour liquor for piece goods, it is only necessary to direct attention to the main feature of the scouring operation which is to loosen and emulsify the oils on the fibers. This means that there should be a sufficient amount of liquor to work the cloth in, and to flow freely from the goods as they pass out of the liquor, and over the roller. It is this mechanical action of the flowing scour liquor that effects the removal of the oils without injuring the texture. The use of a small amount of ammonia

has always been found to act advantageously; usually not more than one or two per cent is added to the scour bath, but this is a matter for the workman in charge to determine.

As to temperature of the bath, any increase over 120 deg. Fahr. is injurious to the wool, causing it to soften, and consequently "felt." The common practice of judging the proper working temperature of the scour bath by immersing the hand for a moment is unsound, since different individuals are affected by hot or warm liquids differently. The only safe guide is a thermometer, and its use should be insisted upon by the "boss." Taking chances in such matters is the general cause of "seconds."

Rinsing after scouring is equally as important as the scouring itself, and no pieces should be permitted to leave the washers until they are known to be free of soap. The presence of soap in the goods works to a disadvantage either in the carbonizing bath, or in the dye bath, owing to the liberation of free fatty acids that remain adhering tenaciously to the cloth.

Water Softening Plant Is Always Advantageous

Of course, to wash soapy cloth clean means that the mill must have an ample supply of soft water. Without soft water the results are not entirely satisfactory. Many mills are troubled with a water supply that fluctuates in quality, and they do not know it. It is not sufficient to have the water analyzed from time to time, without installing a plant that will ensure a delivery of pure water to the scour boxes and the dyehouse. A water softening plant for a moderate sized mill is rather costly, but the sacrifice necessary to such an installation is offset by the subsequent freedom from scouring and dyeing troubles. Clean goods are necessary for perfect dyeing—oils or soap remaining on the cloth will prevent the dye going on the fabric evenly, and no amount of coaxing in the dye bath will overcome the difficulty. Thoroughly cleansed fabrics lessen the labor of both the dyer and finisher.

For worsteds generally, the dyer should select those dyes that go on wool slowly, since such dyes always produce even shades, but their use will not take the place of good scouring and washing. The usual tendency is to hurry the work of scouring, trusting that the subsequent operations will eliminate any defects. Whatever the cause of defective pieces, the results always show prominently after finishing.

Washing After Carbonizing

When worsted cloth is to be carbonized, it is necessary that the goods be afterwards well washed to make sure that the remaining traces of carbonizing chemicals or acids are removed. While some classes of goods may be dyed directly as they come from the carbonizing ovens, and with good results, it is still an advantage with the finer fabrics to wash well before dyeing. This is particularly true when aluminum chloride has been used.

In dyeing worsted cloth, the less the goods are worked in the hot dye bath, the better, but it is desirable to wet them thoroughly in the dye kettle as it is filling up with water. A few minutes' run usually suffices, during which time the steam may be gradually turned on, but not allowing the temperature to go beyond 120 deg Fahr.

As a rule, several pieces of one shade are dyed in the kettle at one time. When the temperature is right, the proper amount of dyestuff for the desired shade is added, the cloth continued in motion until thoroughly saturated with the dye, and then the oil of vitriol previously diluted, slowly poured in. From this stage, the temperature is to be slowly raised to the boiling point, and kept boiling for three-quarters to one hour.

Where the identity of the cloth is known to be the same, matching against standard shades found in commercial shade cards is relatively easy, and usually no shading is necessary; but in almost every other case, the dyer is called upon to add additional, though small, quantities of dyes to "bring up" the shade to match the sample.

Dyer Should Be Informed of Changes in Manufacturer's Cloth Stock

Matching to sample calls for the best skill of a dyer. In dyeing the first set of pieces to match a given sample the dyer is necessarily watching the work every minute, since a slight excess of color may so alter the shade that the pieces could not be offered as a match. It must be said, however, that the average dyer has proven himself to be equal to the emergency, and few serious errors are to be noticed. After the first "set" of pieces is out, then the repeat orders are handled without difficulty. One of the troubles that the dyer has to contend with is the change in quality of the goods delievered to him. It is a matter of frequent occurrence that a dyer is ordered to dye, for example, a batch of ten pieces to match a given shade, and the results are satisfactory not only to the mill, but to the customer. In course of time, a repeat order is received, and another batch of ten pieces is sent down to be dyed. It is found that during the dyeing, they do not "come up" like the previous lot, although everything has remained the same so far as supplies, etc., are concerned. After some trouble on the part of the dyer, a match is obtained in the dyehouse, but it is found out later, when the cloth has gone through the final finishing operations, that it is not identical with the first batch. In most instances of this matter, the trouble originates with a change in the stock employed in making the cloth, and which is noticeable by the performance of the cloth in the dyehouse; but the dyer, not being informed that a change has been made, as-

sumes that the cloth is identical with the original batch, and proceeds with the work accordingly. While the counts of yarn and the weave remained the same, the stock was altered. It is remarkable how slight differences in the stock will materially alter the procedure in the dyeing process.

In adding dyes to the bath, they should be first brought into complete solution with hot water, and strained through fine cloth. This is necessary because some dyes dissolve more readily than others, and for perfection in dyeing, complete solution is essential. In dyeing delicate shades, such as grays, drabs, etc., the dissolved dyes should be added to the bath in several portions, and not all at once.

Use of Few Dyes for Wide Range of Shades

Like a true artist, the most skillful dyer is he who can produce the widest range of shades with the fewest foundation or primary dyes. On reference to the recently issued National Shade Card, showing mode shades on ladies' dress goods, one sees the importance of the above remark. There are illustrated forty-eight dyeings varying from pale salmon through a gamut of intermediate shades, to dark blues, greens, browns, etc., and placing in the hands of the dyer suggestions which will enable him to produce hundreds of other shades that are called for from time to time by the dress goods trade

The foundation dyes are seven in number, and show the possibility of using, with discretion, blues, reds and yellows—not including black. With these seven dyes the worsted dyer who familiarizes himself with their working qualities is in an enviable position.

The following working suggestions for a variety of shades will prove of interest to dyers of the general class of goods above referred to. The quantities given are for batches of 100 pounds each:

BROWN—	Lb.	Oz.
National Wool Orange 2G Crystals	1	14
National Fast Crimson GR	0	5
National Alizarine Sapphire FS	0	5
SMOKE—		
National Wool Yellow Exera Conc.	0	4
National Fast Crimson 6BL	0	3½
National Alizarine Sapphire FS	0	4¾
BRONZE—		
National Wool Yellow Extra Conc.	2	5
National Wool Crimson 6BL	0	15
National Alizarine Sapphire FS	0	0
OLIVE GREEN—		
National Wool Yellow Extra Conc.	0	5
National Wool Orange 2G Cryst	0	4¼
National Alizarine Sapphire FS	0	14
MEDIUM BLUE—		
National Wool Yellow Extra Conc.	0	¾
National Wool Alphazurine 2G	0	2
National Alizarine Sapphire FS	1	6
CARDINAL—		
National Wool Orange 2G Cryst.	2	0
National Fast Crimson 6BL	1	12
LIGHT BLUE—		
National Alphazurine 2G	0	3
National Alizarine Sapphire FS	0	1½
SALMON—		
National Wool Orange 2G Cryst.	0	1½
National Fast Crimson GR	0	½

Review of Recent Literature

Fire Hazards in Chemical Plants. A Study by the National Fire Protection Association. "Chemical Age," April, 1922; p. 181.

It is difficult to devise an adequate classification of special hazard fires, which total 71 per cent of the known causes of fires, because in many instances the rapidity of the spread of the fire has prevented ascertainment of the exact cause. Accordingly, in the tables furnished in the present article, many of these fires have been attributed to the rather indefinite items of "Ignition of Chemical," "Ignition of Inflammable Vapor," etc. The majority of recorded fires were preventable and due to carelessness. The sprinkler record is regarded as very satisfactory, only 5½ per cent failing to operate. Wet and dry systems are indicated to be about equally efficient. The average number of sprinkler heads opening is 23, indicating the severity of fires in this occupancy, and 80 per cent of the fires causing losses above $1,000 occurred in unsprinkled properties Author lists fifteen "special hazard" causes, such as Ignition of Chemical, Foreign Substance in Grinding Mill, Overheating of Kettle or Oven etc., and twelve "common causes," including Matches, Sparks from Locomotive, Defective Wiring, etc. The summary shows common causes as 24 per cent and special hazard causes as 58.8 per cent, of the total, the balance being listed as "unknown causes." The tables analyze 473 fires in industrial plants.

Among special instances given is described a fire in the grinding room of a plant manufacturing coal-tar dyestuffs. The grinders consisted of a number of discs revolving at high speed. The material to be ground is thrown against a wide steel ring, inside of which the discs revolve. The ground color is discharged from the mill with considerable velocity into horizontal steel-cased mixers. A vent to relieve air pressure is provided in the form of a cloth balloon with a return pipe to the grinder.

An iron bolt accidentally got into the grinder and when a spark was struck, fire instantly flashed through

to the mixer and out again into the balloon, where a mild explosion took place. The flame flashed through the room and to the floor above. Sprinklers did good work in extinguishing the fire, although several barrels of color burned for some time. The loss was small considering the severity of the fire.

The Lubrication of Wool. A Discussion of the Oils and Methods Used in Lubricating the Wool Fiber during the Spinning Process. B. X. C. Baily. "Canadian Textile Journal," April 25, 1922; p. 162.

In lubricating wool for combing it is perhaps not quite so necessary to think about dyes, as most of the work is done in the white; great care must be taken, though, to see that the tops are a good white; in Bradford it is common to blue the tops in the back-washing machine to do away with any tint of yellow that is likely to appear on the wool.

Animal oils are likely to set on the wool, thus making it difficult for the scourer to eliminate; this is especially so in cases where the yarn has to wait a considerable time before it is woven up, as, for example, worsted yarn shipped from Bradford to Japan; in cases like this a little mineral oil is added to the oil that is put on the wool, and this seems to be fairly satisfactory. This also is the case with vegetable oils, and it is very necessary to avoid oils that dry rapidly. In the Canadian trade the yarn does not, however, usually have to wait so long and therefore this point is not so important.

Owners who use cheap grade oils should carefully consider their bills for detergents, and will probably find that the price of oiling and washing and steaming, if added together, will be very little less than if a high grade oil had been used. The amount saved will at any rate be found to be out of all proportion to the large difference in appearance of the goods turned out.

Patents and Chemical Research. H. E. Potts. 198 pages; 8s. 6d.; The University Press of Liverpool.

This is an able presentation in condensed form of the elementary principles of English patent law in the language of the chemist-layman.

The author is an experienced English patent agent and he addresses himself primarily to the director of industrial chemical research and to the manager of the chemical manufacturing plant. The impelling purpose of the book is stated in the preface as follows:

"Therefore it is most desirable that chemists should familiarize themselves with the leading principles of patent law; first, to enable them to co-operate with the patent agent and thus contribute to the object of obtaining secure protection for their inventions, and, second, so that their criticism will stimulate patent agents to maintain the highest level of professional skill. In this way, better work will be done, and the greatest benefits will be derived from the patent system."

Throughout the text, hypothetical as well as actual chemical cases are freely used with remarkable success for purposes of illustration. The first chapter is entitled "Patents as an Element of Business Policy," and deals especially with the relative advantages of patenting as against secret working as a means of protecting valuable chemical processes under the English law. The remaining chapters, except the last, deal with the cardinal principles of the English patent system. The last chapter treats briefly of the patent systems of other countries.

The book is well indexed but one might wish for more clearly marked subdivisions of the subject matter of the different chapters. There is a special index of cases, and subject titles of many of these cases are given in chemical terms—a distinct help to the chemist-reader.

The exposition primarily concerns the English patent system rather than that of the United States, and although many fundamental concepts are common to both systems it may not be amiss to caution the American chemist-reader against applying too directly in this country conclusions derived from a study of this book alone. The chapter entitled "Patents in Other Countries" will be helpful in indicating the numerous possible pitfalls in this direction.

In the opinion of the reviewer no single publication in recent years has greater potentialities for increasing the real effectiveness of systematic industrial research than the appearance of this book. A corresponding book dealing primarily with the United States patent system is greatly to be desired.—A. S. McDaniel through "Jour. Ind. and Eng. Chem."

The Decortication of Fibrous Plants H. R. Carter. London: Bale, Sons & Danielsson, Ltd. 4s. net.

Cotton spinners are fortunate in the sense that they have never had cause to realize the amount of labor that must be expended in producing spinnable material from most other fibrous plants. The separation of flax, hemp, and jute fibers from the woody or pulpy matter with which they are associated as they come from the field or plantation, is only accomplished by a very considerable amount of labor, some of which is distinctly disagreeable. This separating process is termed decortication, and in the present volume of 80 pages, Mr. Carter gives a description of the requirements of the process in general, and also brief descriptions of various types of machines and apparatus now available for the process. The separation of stem fibers is much more easily accomplished than the separation of leaf fibers, and both the processes and the mechanisms used are very different. Stripping the leaves of phormium (New Zealand flax), cleaning Manila hemp, sisal hemp, hard-fiber decorticators, are

dealt with in turn; and then the author gives a long chapter describing in detail the various methods of retting practised in Europe.

Yarn Printing. British Patents 175,310 and 175,584; C. Alvord, Worcester, Mass.

Apparatus described is chiefly designed for printing, before weaving, yarn to be used in the manufacture of carpets, pile goods and upholstery.

The printing rollers are mounted on an intermittently reciprocating carriage, so that patches of color are laid on the threads of yarn lying side by side on a support. The application of color and the determination of the distances apart of various color impressions are controlled by jacquered mechanism, which brings about the rotation of the yarn-supporting cylinder alternately to the operation of the coloring mechanism. Numerous devices are provided for varying the intervals and lengths of color application. Color scrapers are also provided for removing ridges of color dye formed between contiguous color stripes.

Recent Patents

Ortho-oxyazo Dyes

(1,408,297; February 28, 1922)

WILHELM HERTZEBERG, Berlin-Wilmersdorf, and OSWALD SCHARFENBERG, Berlin-Schoneberg (assignors to Actien Gesellschaft fur Anilin Fabrication)

This relates to new orthooxyazo dyes which may be obtained by combining a polyhalogen-2-diazo-1-oxyderivative of the benzene series with an acidylaminooxynaphthalene sulphonic acid. These new dyes form in the dry pulverized state of their sodium salts dark powders soluble in water with blue to violet color, the aqueous solution becoming more reddish by addition of sodium carbonate and red by addition of sodium hydroxide, by an acid a violet-red precipitate being separated.

The new dyes when dyed in the presence of an alkali metal chromate and an ammonium salt, such as ammonium sulphate, furnish on wool blue tints of an excellent fastness to the action of light, to washing and to milling; the same shades being obtained by dyeing on wool mordanted with a chromium mordant or by dyeing wool in an acid bath and treating these tints afterwards with a chromium mordant. In order to illustrate the product, the following examples are given, the parts being by weight:

1. 21.3 parts of 3.4.5-trichloro-2-amino-1-oxybenzene are diazotized by means of 6.9 parts of sodium nitrite and 50 parts of hydrochloric acid of 12 deg. Be. specific gravity. The diazo compound is allowed to run into a solution of 28.1 parts of 1-acetylamino-8-oxynaphthalene-4-sulphonic acid, alkaline with sodium carbonate. The dyestuff is salted out and worked up as usual. It dyes wool with chromium mordants blue tints of an excellent fastness.

2. The diazo-compound of 21.3 parts of 3.4.6-trichloro-2-amino-1-oxybenzene is coupled with 39.3 parts of 1-toluol-sulphamino-8-oxynaphthalene-4-sulphonic acid in a solution containing sodium carbonate. The dyestuff separated in the usual manner dyes wool with chromium mordants blue tints.

3. The diazo compound of 19.2 parts of 4-methyl-3.5-dichloro-2-amino-1-oxybenzene is united with a solution of 28.1 parts of 1-acetylamino-8-oxynaphthalene-4-sulphonic acid, alkaline with sodium carbonate. The dye is worked up in the usual manner; it dyes on wool with chromium mordants reddish blue tints.

Claims allowed include:

1. The new orthooxyazo dyes which form in the dry pulverized shape of their sodium salts dark powders soluble in water with blue to violet color, from which an acid separates a violet-red precipitate, the aqueous solution becoming more reddish by addition of sodium carbonate and red by addition of sodium hydroxide, yielding upon reduction a polyhalogen-2-amino-1-oxy-derivative of the benzene series and a monoacidyl-diaminooxynaphthalene-sulphonic acid, dyeing on wool in the presence of an alkali metal chromate and an ammonium salt, such as ammonium sulphate, blue tints of an excellent fastness, the same shades being obtained by dyeing on wool mordanted with chromium mordants or by dyeing wool in an acid bath and treating them afterwards with chromium mordants, these dyes which may be obtained by combining a polyhalogen-2-diazo-1-oxyderivative of the benzene series with an acidyl-amino-oxynaphthalene-sulphonic acid.

2. The new orthooxyazo dyes which form in the dry shape of their sodium salts dark powders soluble in water with blue to violet color, from which an acid separates a violet-red precipitate, the aqueous solution becoming more reddish by addition of sodium hydroxide, yielding upon reduction a polyhalogen-2-amino-1-oxybenzene and a monoacidyldiamino-oxynaphthalene-sulphonic acid dyeing on wool in the presence of an alkali metal chromate and an ammonium salt, such as ammonium sulphate, blue tints of an excellent fastness, the same shades being obtained by dyeing on wool mordanted with chromium mordants or by dyeing wool in an acid bath and treating them afterwards with chromium mordants, these dyes which may be obtained by combining a polyhalogen-2-diazo-1-oxybenzene with an 1-acidylamino-8-oxynaphthalene-sulphonic acid.

3. The new orthooxyazo dyes which form in the dry pulverized shape of their sodium salts dark powders soluble in water with blue to violet color from which an acid separates a violet-red precipitate, the aqueou-

solution becoming more reddish by addition of sodium carbonate and red by addition of sodium hydroxide yielding upon reduction a polychloro-2-amino-1-oxybenzene and 1-acidylamino-7-amino-8-oxynaphthalene-4-sulphonic acid, dyeing on wool in the presence of an alkali metal chromate and an ammonium salt, such as ammonium sulphate, blue tints of an excellent fastness, the same shades being obtained by dyeing on wool mordanted with chromium mordants or by dyeing wool in an acid bath and treating them afterwards with chromium mordants, these dyes which may be obtained by combining a polychloro-2-diazo-1-oxybenzene with 1-acidylamino-8-oxynaphthalene-4-sulphonic acid.

4. The new orthooxyazo dyes which form in the dry pulverized shape of their sodium salts dark powders soluble in water with blue to violet color, from which an acid separates a violet-red precipitate, the aqueous solution becoming more reddish by addition of sodium carbonate and red by addition of sodium hydroxide yielding upon reduction a trichloro-2-amino-1-oxybenzene and 1-acidylamino-7-amino-8-oxynaphthalene-5-sulphonic acid, dyeing on wool in the presence of an alkali metal chromate and an ammonium salt, such as ammonium sulphate, blue tints of an excellent fastness, the same shades being obtained by dyeing on wool mordanted with chromium mordants or by dyeing wool in an acid bath and treating them afterwards with chromium mordants, these dyes which may be obtained by combining a trichloro-2-diazo-1-oxybenzene with 1-acidylamino-8-oxynaphthalene-4-sulphonic acid.

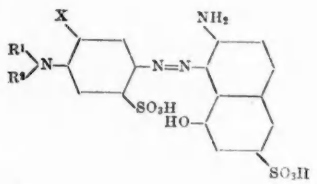
5. The new orthooxyazo dyes which form in the dry pulverized shape of their sodium salts dark powders soluble in water with blue to violet color, from which an acid separates a violet-red precipitate, the aqueous solution becoming more reddish by addition of sodium carbonate and red by addition of sodium-hydroxide, yielding upon reduction a trichloro-2-amino-1-oxybenzene and 1-acetylamino-7-amino-8-oxynaphthalene-4-sulphonic acid, dyeing on wool in the presence of an alkali metal chromate and an ammonium salt, such as ammonium sulphate, blue tints of an excellent fastness, the same shades being obtained by dyeing on wool mordanted with chromium mordants or by dyeing wool in an acid bath and treating them afterwards with chromium mordants, these dyes which may be obtained by combining a trichloro-2-diazo-1-oxybenzene with 1-acetylamino-8-oxynaphthalene-4-sulphonic acid.

Azo Dyes

(1,408,405; February 28, 1922)

Bernard Schoner and Otto Siebert, Dessau, Anhalt, Germany (assignors to Actien Gesellschaft fur Anilin Fabrication)

This describes new azo dyes as free acids corresponding to the general formula:



R^1, R^2 meaning substituents, such as hydrogen, alkyl-, aralkyl-, acidyl-groups, X meaning an univalent substituent.

Such dyes are obtained by coupling in acid medium 4-aminodiazobenzene-2-sulphonic acid derivatives with 2-amino-8-naphthol-6-sulphonic acid. The same dyes may be manufactured by combining 2-amino-8-naphthol-6-sulphonic acid with 4-nitrodiazobenzenesulphonic acid, by reducing the nitro group and by substitution of the resulting amino group in the desired manner. The new dyes form in the dry state dark powders soluble in water with bluish red color, less soluble in alcohol, unsoluble in ether and benzene. By reducing agents they are destroyed. They dye on wool bluish red tints of a very good fastness to the action of light and to washing and equalize in an excellent manner.

The following examples serve to illustrate, the parts being by weight:

1. Twenty-six parts of the 6-acetylamino-3-amino-1-methoxybenzene-4-sulphonic acid are diazotized in the usual manner and united with twenty-four parts of 2-amino-8-naphthol-6-sulphonic acid which may be dissolved in an alkali and separated by addition of an acid in form of a fine precipitate. In order to finish the reaction sodium acetate is added. The resulting dye is salted out, filtered and dried. It forms in dry state a dark powder, soluble in water with reddish blue color, less soluble in alcohol, unsoluble in ether and benzene. By reducing agerts it is destroyed. It dyes on wool bluish red tints of an excellent fastness to the action of light.

2. The dye which may be obtained by coupling of the diazo compound of 21.8 parts of 4-nitro-aniline sulphonic acid with twenty-four parts of 2-amino-8-naphthol-6-sulphonic acid and by reducing the nitro group is mixed with 400 parts of water and 250 parts of methyl alcohol. Twelve parts of sodium carbonate and twenty parts of methyliodide are added; the mixture may be heated for three hours in an autoclave to 95 to 100 deg. Cent. Then the methyl alcohol and the excess of methyliodide are eliminated by distillation and the dye is separated by common salt. It forms in the dry shape a dark powder, soluble in water with bluish red color, less soluble in alcohol, insoluble in ether and benzene. By strong reducing agents it is destroyed. It dyes wool beautiful bluish red tints of a very good fastness.

3. The sodium salt of the dye 4-aminoaniline-2-sulphonic acid-azo (1) 2-amino-8-naphthol-6-sulphonic

acid (compare example 2) is treated in aqueous solution with the corresponding quantity of acetic anhydride. The dye is separated by addition of common salt. It forms in dry state a dark powder, soluble in water with bluish red color, less soluble in alcohol, unsoluble in ether and benzene. By strong reducing agents it is destroyed. It dyes wool in bluish red tints of very good fastness.

4. The solution of fifty parts of the sodium salt of the dye 3-aminoaniline-2-sulphonic acid-azo-(1) 2-amino-8-naphthol-6-sulphonic acid in 250 parts of water is heated to 75 deg. Cent. and stirred with sixty parts of benzoyl chloride In the course of an hour ten parts of calcium carbonate are added. The mixture is stirred for an hour, the temperature being kept at 75 deg. Cent. The dye is separated with common salt. In the dry state it forms a dark powder, soluble in water with bluish red color, less soluble in alcohol, unsoluble in ether and benzene. It is destroyed by strong reducing agents and dyes on wool bluish red tints of a very good fastness.

Ortho-oxyazo Dyes for Wool

(1,408,296; February 28, 1922)

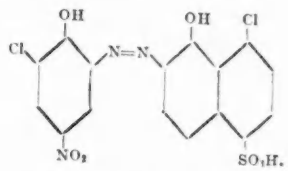
WILHELM HERZBERG, Berlin-Wilmensdorf, and OSWALD SCHARFENBERG, Berlin-Schoneberg, Germany (assignors to Actien Gesellschaft fur Anilin Fabrication)

By combining a diazotized 2-amino-phenol derivative which contains negative radicals such as halogen, nitro-group with 8-halogen-1-oxynaphthalene-5-sulphonic acid new valuable dyestuffs for wool are produced the chromium lakes having a very good fastness.

They form in the dry pulverized state dark powders soluble in water to a violet solution and are insoluble in alcohol, ether, benzene, being destroyed by strong reducing agents and dyeing on wool with chromium mordants black to greenish black tints. The following example illustrates, the parts being by weight: 18.9 parts of 2-amino-4-nitro-6-chloro-1-oxybenzene are diazotized by means of 6.9 parts of sodium nitrite and 50 parts of hydrochloric acid of 12 def. Be. specific gravity. The diazo compound is coupled with 26 parts of 8-chloro-1-oxynaphthalene-5-sulphonic acid in a solution containing sodium carbonate. The dyestuff is separated and worked up in the usual manner. It dyes wool with chromium mordants black tints of a very good fastness.

Claims granted include the following:

The herein described new orthooxyazo dye being in the shape of alkali metal salt a dark powder soluble in water to a reddish violet solution from which an inorganic or organic acid separate a yellowish red precipitate, the aqueous solution becoming red violet by addition of sodium carbonate, red by addition of sodium hydroxide, yielding upon reduction 8-chloro-2-amino-1-oxynaphthalene-5-sulphonic acid and 2.4-diamino-6-chloro-1-oxybenzene derivative, dyeing on wool with chromium mordants black tints and corresponding as free acid to the formula:



Cloth Plaiting or Piling Machine

(1,408,083; February 28, 1922)

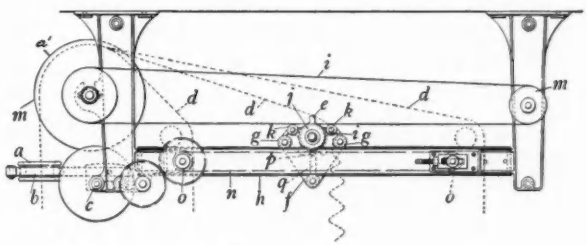
ALBERT DUROT, Manchester, England (assignor to James Farmer & Sons, Ltd., Salford, Manchester)

Inventor states that heretofore it has been proposed to plait or pile cloth in rope form by passing it through a guide-eye traversed back and forth across and over a winch reciprocated both along and across the machine.

The object of this invention is to provide an improved construction of piling machine, and it consists in the combination with a guide-eye cross-traversed by a continuously rotating right and left hand screw and supported independently of the winch carriage, of a winch extending the full width of the machine and having a reciprocatory movement imparted thereto by endless moving chains carrying lugs projecting into elongated slots in the winch carriage, the cloth from the guide-eye passing over a drawing roller or drum on its way to the winch.

The drawing is an end elevation of a cloth plaiting or piling machine constructed in accordance with this invention.

The cloth in rope form is passed through a pot or other guide-eye which is supported on an arm traversed back and forth across the machine in the known



manner by a right and left hand rotating screwed rod.

The cloth from said guide passes over a drawing roller or drum to a winch which is of any usual form extending from side to side of the machine and adapted to give the cloth rope as it descends therefrom a wave-like motion for piling purposes. The winch carriage or frame runs on rollers upon suitable rails or angle irons and the winch is rotated by a belt running round the winch pulley over tension rollers on the winch frame and over pulleys, one at each end of the machine.

The longitudinal traverse or reciprocation of the winch frame is effected by two endless chains running over sprocket wheels supported by the rails or angle irons aforesaid. A lug-like part projects from each chain and each lug enters an elongated slot in a side member of the winch frame.

Thus, as the chains are moved they carry the winch frame with them. As the lugs pass round the chain sprocket wheels they move along the slots aforesaid, either rising or falling in same, and so come into position to move the frame in a reverse direction.

Process of Dyeing

A process of dyeing unbleached cotton material is described in a recent British patent granted to the Surpass Chemical Company, Inc., Albany, N. Y. The process is primarily adapted for use on unbleached knitted cotton goods, or yarns from which it is desired to remove motes, shives or leaf, and dye the material in the same bath. According to the process described by a prior patent, the material was first dyed and then treated for speck removal, but in the later process the material is first dyed, and then in the same bath is treated with an alkaline oxidizing agent which, it is claimed, removes the specks, motes, shives, leaf and like impurities without adversely affecting the dye.

The alkaline oxidizing agent for the bath is preferably composed of about one-half each of peroxide of sodium and an alkaline sodium salt, and is used in the proportion of about 3 per cent of the weight of the goods under treatment. It has been found that sodium peroxide gives more satisfactory results than other oxygen-liberating products, because when sodium peroxide is subjected to decomposition in the bath, and upon the release of its oxygen, it generates sodium hydro-oxide, which is strongly alkaline—a condition of the bath which is necessary to the complete success of the process, and to shorten the time required for removing the motes, shives, leaf, etc.

The procedure for carrying out the dyeing process is as follows: The cloth is run into the dye machine, wetted out, the necessary dyestuff added to the bath, and the bath brought to a boil and boiled for ten minutes; 5 per cent or more of common salt is added, and the bath boiled for thirty minutes. Steam is then shut off, and the necessary amount of the alkaline oxidizing agent is added to the bath, and the goods are allowed to run thirty minutes without steam. Steam is then turned on, and the bath brought to a boil and continued there for fifteen minutes. Steam is again turned off and the goods allowed to run in the bath without steam for thirty minutes. The goods are then rinsed and the liquid extracted therefrom.

Conferences between duck manufacturers and users and officials of the Bureau of Standards are likely to result in the adoption of national legislation standardizing the width of cotton duck, it is said.

NOTES OF THE TRADE

The Locke Cotton Mills, Concord, N. C., are to build a new dyeing plant at their mills in Locke, N. C.

Conversion Products Corporation has been incorporated at Wilmington, Del., with a capital of $100,000, to deal in dyestuffs, by John J. Doeley, George W. Study, Lester C. Burlett New York. Incorporated by United States Corporation Company.

The Southwest Chemical Company, Dallas, Texas, has been incorporated, with a capital of $10,000. The incorporators are J. William Morrow, M. G. Harris and J. F. Harrington, all of Dallas.

Lichtman Textile Company, New York, has been incorporated to manufacture silk goods The capital is $500,000, and the incorporators are Irving Zisblatt, Paterson, N. J.; Leo Lichtman and Rose Rosenberg.

Albert A. Lane, Inc., East Orange, N. J., has been incorporated to manufacture silk and other fabrics. The capital is $100,000, and the incorporators are Harry H. Picking, F. E. Lynch and M. J. Deremer, all of East Orange.

The American Textile Soap Company, Springfield, Mass., has incorporated the business under the same name, with a capital stock of $100,000. The incorporators are Robert F. Warren and Charles A. Stone both of this city, and Albert F. Alstrom of West Springfield, Mass.

Many uses have been found for raw or dehydrated coal tar, states W. W. Odell, fuel engineer of the United States Bureau of Mines, in Technical Paper 268, just issued. In fact, these are so numerous that there is no longer an excuse for throwing tar away or disposing of it wastefully. Some of the uses for tar and preparations in which it is employed are as follows: Timber preserving, fuel, tarred felt, paint for stone, brickwork, and iron, road-construction material and road-dust settler, waterproofing compounds for cement and for roof paint, germicides, and miscellaneous special preparations.

Soleliac Silk Company, Allentown, Pa., has leased space in the Ocurto mill building, and is to install machinery for the manufacture of silk fabrics, principally linings. Recently, 100 looms and complementary machinery was purchased from the Widmer Silk Company, and this equipment has been installed in the new plant. The Soleliac Silk Company was formed a short time ago with E. A. Soleliac and James Kingston as the principal owners.

AMERICAN
DYESTUFF REPORTER

Devoted to the use and application of dyestuffs and the mechanical equipment incidental thereto.

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Published biweekly by

HOWES PUBLISHING CO., INC.
4109 Woolworth Building, New York City

A. P. HOWES, *President* E. S. PREDMORE, *Secretary*

Subscription price $5.00 per year; Canadian $5.50; foreign $6.00.

Vol. X May 22, 1922 No. 11

WELCOME TO THE KNITTING ARTS EXHIBITION

BY a happy combination of circumstances, several branches of the industry are this year co-operating to make the Knitting Arts Exhibition a real business stimulant from start to finish, in all branches and angles. The immense floor area of the Museum Building offers a striking opportunity for the event to fully reflect the importance and magnitude of this branch of the industry, and the contemporary Convention of the National Association of Hosiery and Underwear Manufacturers assures at all times a large and interested attendance. Managers of the Exhibition declare the present showing will eclipse previous successes. Those who will make use of the educational and business opportunities offered during the present week, will be amply repaid for their discernment and energy. Those who fail to recognize its latent potentialities will have only themselves to thank for wasted time. A glance around the hall should make it obvious that here, and now, is a time for renewing old connections and forming new ones, for gaining friends and instruction, for comparison and interchange of ideas and methods, and for co-operating to the end that the good effects of the present Exhibition may be felt throughout the entire year.

The AMERIAN DYESTUFF REPORTER, from its booth in the exposition hall, is glad to join with other exhibitors in welcoming you to the Show. We ask that you make our headquarters your own whenever you so desire, and extend our cordial invitation for you to make free use of such facilities as we have to offer for rest, appointments, or the exchange of trade news. We shall be glad to have you "drop in" at any time in the assurance that you will be welcome.

THE CHEMICAL SHOW IS COMING

COINCIDENT with the opening of the Knitting Arts Exhibition comes the first announcement in reference to the forthcoming Eighth National Exposition of Chemical Industries, which will be found elsewhere in this issue. Having tried the Eighth Coast Artillery Armory, the Bronx, in 1921, and having found this superb hall decidedly unpopular because of its location—though not on account of its facilities—the Chemical Show finds itself by common consent back again at the scene of its former successful exhibitions, the Grand Central Palace. The date of the Show is set for the week of September 11 to 16, inclusive, and will follow on the heels of the American Chemical Society's Fall meeting.

The interests for industrial chemistry in the Exposition are wide and varied: from raw materials in minerals, ores, manufacturing crudes or by-products, through the range of machinery, apparatus and equipment and instruments for control, precision, recording, gauging and measuring, and a thousand other items used in converting the raw materials into the finished products. The finished products themselves, whether they be organic, inorganic, solid, liquid, gaseous, or of any other form, are all to be there. Many new things upon which manufacturers were working when the war ended and which have been more leisurely perfected since will be shown for the first time. Industrial progress continually calls for greater advancement and perfection in manufacture, and each year sees many notable improvements upon the exhibits in the Exposition. Counting only these, the time of technical and business men is well spent in inquiring into the exhibits. One exhibitor, who for the past few years has been devoting time to the perfection of a new form of apparatus, said the other day that it is now when men have time to spare for consideration of these things that he expects a consideraably larger and more interested attendance in his booth.

The managers report that three full floors of the Grand Central Palace are already taken for the Exposition and a part of a fourth. They expect all space will be engaged before the opening date. Already, 303 exhibitors have contracted for space.

It is as yet too early to give space to a detailed consideration of the character of the individual exhibits, but it is not too early to give thought to the importance of this affair, the magnitude and country-wide influence of which continues to grow from year to year. "Raw Materials, Machinery, Products" is the descriptive "catch-line" chosen to be featured in connection with the Show, and it is needless to say that new things of interest will be displayed under each of these three classifications.

You who are attending the Knitting Arts Exhibition should not fail to plan, now, for an attendance at the Chemical Show, either as exhibitor, purchaser, or seeker after up-to-date information concerning a group of industries which are found to affect you in some manner, no matter what your occupation or interests.

FAREWELL TO THE DYE INVESTIGATION

ALTHOUGH hearings had been resumed for a brief period at the present writing, the King dye monopoly investigation was practically over, and as each witness had completed his testimony the fact was more forcibly and increasingly evident that the domestic dye industry had been completely vindicated. Seven weeks were consumed in the hearings, and thus far not one person who has testified before the committee has shown that any monopolistic tendency exists. Importers, manufacturers, and users of dyes have all appeared, and each in turn has testified that there is no monopoly of any kind. Even the small producer has failed to appear and testify to the existence of a monoply.

The second item that the committee was charged to investigate was the question of lobbying. There has been no testimony that there has been lobbying, nobody has defined lobbying, and apparently there has been no attempt to prove that there has been lobbying. Senator Shortridge, chairman of the investigating subcommittee, repeatedly announced that if anyone had any evidence, or wished to ask any questions relative to lobbying or monopoly, he was free to appear and question the witness or the committee. Yet no one appeared to propound such questions—not even Senator King himself, who thereby forfeited his claim to serious attention in the future when speaking upon this subject.

Yet, in the face of his refusal to cross-question witnesses representing the very firms against which he has been hurling charges, both in the Senate and at the hearings, the Utah legislator again had the assurance to renew these attacks at the debates over the Fordney tariff which were begun toward the end of the investigation.

He continued to deal in large figures. He declared, for instance, that concerns like the Powers, Weightman & Rosengarten Company, Inc., and Parke, Davis & Co. have "derived enormous profits in their business." The last named company, he said, had not sought tariff rate increases. One of the beneficiaries of the bill, declared Senator King, would be the Union Carbide & Carbon Corporation, with $225,000,000 capital. This bill 'will put millions of ill-gotten gains, wrung from the pockets of the poor, into the coffers of this gigantic corporation," said Senator King, and continued:

"There is the Sherwin-Williams Company, which is to be benefited by this bill. Its assets are $42,942,067. Is that an infant industry? It has to do with the paints and the varnishes that go to the farms and homes of the people. When we want building prices to come down, and when we are seeking the adoption of a policy which will enable men and women to secure homes, we are now by this bill making it more difficult for them to do so. We swell the mighty fortunes of the Paint Trust and the Varnish Trust and the other trusts, some of which are ancillary to the Sherwin-Williams Company, with its enormous capital.

"The Grasselli Chemical Company is to be benefited by this bill. It is one of the organizations that has had its representatives here for months clamoring for increased rates. Its capital is $40,000,000.

"The Mathieson Alkali Works has a capitalization of $12,266,369.

"The Monsanto Chemical Works has a capitalization of $10,242,660.

"The Merrimac Chemical Company has a capitalization of $7,825,029."

He also wanted to know, of course, if E. I. du Pont de Nemours & Co., which he said manufactured many drugs and chemicals and had a capital of $253,000,000, was "an infant industry" to be protected not only by high rates but in some cases by an embargo.

"The Allied Chemical & Dye Corporation, with a capital of $300,000,000, is one of the chief beneficiaries under this schedule," he stated. "This stupendous octopus that sends its tentacles into the homes of the people throughout this land is a demander of high rates and even an embargo on some of its products."

The capital of the combined American chemical industries, according to Senator King, is $5,200,000,000—but he neglected to say just what percentage of this astonishing figure is invested in the dye industry.

And so forth, with all his usual vigor. It is strange that even more of the general public has not, by this time, penetrated the Senator's methods. Perhaps it is because not enough of them have paid sufficient attention, but at all events, there is no longer any doubt as to his status among his confreres, among whom he stands forth as a phrase-maker, an orator of endurance and considerable ability—a spell-binder, if you will—but not to be held to strict accountability for statements made in connection with this subject.

A far saner and less biased viewpoint is displayed by one of the representatives of what may be referred to as "the other side." At the final session of the hearings, Dr. Samuel Isermann, president of the Chemical Company of America, admitted that some dyes manufactured in the United States can be protected by the tariff, but only a few of them can be thus protected. Most of the dyes, he told the committee, need an embargo.

The small dyestuff manufacturers of the United States, Dr. Isermann said, have helped to build up the dyestuff business. While the larger manufacturer has taken the line of least resistance, the small manufacturer has experimented with refinements.

There is no difficulty in getting vat dyes from abroad to-day, Dr. Isermann said, and he pointed out that the present imports in the United States of vat dyes are greater now than they were in 1914. He agreed that at times there is some trouble in obtaining licenses. He pointed out, however, that in March of this year between 350 and 400 licenses were issued to bring dyes from Germany, Switzerland and other countries.

He told the committee that there is an overproduction of certain kinds of dyes in the United States, while there is a shortage of others. He said that with proper legisla-

tion even the small dyestuff manufacturer should be able to obtain financial support.

There one finds a far better summing up of the situation by one who would of necessity have the greatest reason to complain if Senator King's monopoly charges were true. Dr. Isermann speaks, with specific authorization, for the many smaller manufacturers of coal-tar products in this country, and it is these and not Senator King who have something real at stake, and who might logically be expected to speak their minds with great freedom if they were being threatened by existing or proposed legislation.

One is impelled to hark back to a remark made before the start of the investigation by Senator Brandegee, who declared, "An investigation of the King proposal will not amount to anything." Others, supporting Senator King in his charge that a monopoly exists, added that they did not believe such an investigation would disclose anything new.

Which was to say that the investigators would be unable to prove the presence of a monopoly in the American dye industry and that the taxpayers' money would be frittered away on just one more futile project.

Those supporters of Senator King who did not favor an inquiry maintained that what had gone before was conclusive.

It is. They have openly charged, rather loosely it has seemed to The Reporter, that the American dye industry is a "huge trust," seeking to take advantage of the industries depending upon dyes for their successful operation and competition with foreign firms. They have made these charges with an air of uttering an axiom; they have striven to interlard their speeches with careless references to the "dye trust" and the "dye monopoly" in such a manner as to inspire the belief that the existence of this monster was something universally understood and agreed upon from the beginning—so patent, in fact, that its actual demonstration would be superflous.

This has most conveniently spared them the necessity of submitting proofs. It is an ancient artifice, but it is still tried from time to time. Nevertheless, they have submitted nothing whatever during the various hearings to show that they have the slightest provocation for their bored and presumptuous way of branding the dye industry as a monopoly; while, on the contrary, excellent evidence has been produced to show that this label is a false one.

That is the conclusive part of past discussions.

Small wonder, then, that some would not unduly exert themselves to bring about an investigation which would put these assertions to the proof. It is about time this nonsense was dropped out of the dye problem, once and for all. There has been sensation-mongering enough, and both dye manufacturers and dye consumers the country over are heartily sick of it. To consume three whole years in determining upon a plan of action, as the Senate has succeeded in doing, is little short of disgraceful. The simple matter of deciding how much protection the dye industry ought to get has degenerated into a farce.

TEXTILE ALLIANCE ISSUES BULLETIN NO. 40, OF REPARATION COLORS

Consumers of dyestuffs are in receipt of Bulletin No. 40, just issued by the Textile Alliance, Inc., from its headquarters at 45 East Seventeenth Street, New York City, containing the latest revised list of German colors available through Reparation sources.

In a special note by the Alliance it is explained that frequent changes—usually downward—are occurring in the prices of dyes from Germany. These changes not only affect the cost of the dyes abroad, but also the duty to be paid upon their importation. The publication of prices at this time, therefore, would not be useful and might prove misleading and injurious to American consumers, who are urged by the Alliance to advise that organization of their needs as they arise and obtain the prices in effect at that time. On such occasions, prices quoted will be for dyes in orignal containers, f. o. b. warehouse at Long Island City, N. Y., all charges paid unless otherwise stated.

The dyes listed are "without guarantee" but are offered upon the representation of the German Government that they are of standard pre-war quality.

The offerings included under the various classifications are supplied by the following firms: Direct Cotton Dyes, by Bayer, Cassella, Badische, Berlin, and Kalle; Direct Dyes Diazotized and Developed, by Bayer, Cassella, Meister Lucius & Bruning, and Berlin; Acid Dyes, by Bayer, Cassella, Badische, Meister Lucius & Bruning, Berlin, and Kalle; Chrome Dyes, by Bayer, Cassella, Badische, Meister Lucius & Bruning, and Berlin; Basic Dyes, by Bayer, Cassella, Badische, Meister Lucius & Bruning, and Berlin; Alizarine Dyes, by Bayer, Badische, and Meister Lucius & Bruning; Vat Dyes, by Bayer, Cassella, Badische, Meister Lucius & Bruning, and Kalle; also other dyes by Griesheim and Mulheim, including Developer B, by Bayer.

1922 FALL SEASON COLOR CARD, HERE, SHOWS EIGHTY COLORS

The Textile Color Card Association of the United States, Inc., has just released for general distribution to the trade the 1922 Fall Season Color Card of America. This is the authoritative forecast for fashionable colors, used by all branches of industries and trades. It contains eighty colors, sixty-six of which are portrayed in silk and twelve in woolen fabric. Twelve shoe, leather and hosiery shades are featured under separate grouping.

As America's color arbiter, the Association presents an imposing array, resembling all the rich burnished tones of autumn foliage, with virile hues much in evidence. Exotic greens and yellows, reds, blues and orange reflecting the present Oriental and Russian influence of the mode, are prominent, in a group of evening shades, such as Poinsettia, Chinese Green, Celestial, Golden Glow and Eglantine.

A distinctly new type of smart tans are descriptively named Muffin, Toast and Tiffin. An interesting feature

is the introduction of bright greens of Gaelic persuasion, called Killarney and Erin.

There is also a group of odd coppery greens of the Russian type named Kremlin, Samara and Narva. Bittersweet, a deep orange, and Brickdust, a rich copper-red, are two new shades of distinction. Grays are featured in both light and medium tones, such as Wood Ash, Fog and Lead. Purples are quite prominent—a range of beautiful violet tones are given ecclesiastical names, Nuncio, Pontiff and Vatican. Another range of purples are on the reddish tint, called Mallow and Cyclamen. Various new shades of brown, quite suggestive of the Far East are Spice, Ginger and Chutney, Rangoon and Mandalay.

Kashan is a deep turquoise, named after the famous Persian pottery. Ranges of deep oxheart reds, brilliant liberty blues, also soft firmament blues and deep sand shades are also offered. Periwinkle and cornflower blues, as well as light fuchsia shades from the Spring 1922 Card are again shown.

Of special interest among the woolen group is a novel tan shade called Pigskin. Apache and Tuscany are new browns with golden and reddish undertones. A distinctly new red is introduced, called Akbar. A deep wine shade is named Armada, and Dante is a very dark purple of slightly reddish cast. An exotic blue is called Hankow, and Gargoyle is a novel medium gray.

The shoe and hosiery colors feature Silver, Mist and Pigeon grays, also soft fawns, Otter and Mouse shades. Browns are much in evidence ranging from light golden to reddish dark Rembrandt shades.

DU PONT ANNOUNCES SULPHOGENE GOLDEN BROWN R AND DU PONT NAPHTHANIL SCARLET R BASE

The Dyestuffs Department, Sales Division, E. I. du Pont de Nemours & Co., Inc., announce an addition to their line of Sulphur colors in a new product which they offer under the name of Sulphogene Golden Brown R.

The color is identical in all of its properties to their Sulphogene Golden Brown G. This new color is brighter and redder in shade than the "G" brand, however.

The offering is exceptionally soluble and therefore is useful in machine dyeing as well as pad and jig work. An aftertreatment will improve the fastness to light, perspiration, cross dyeing, acids and washing and the shade is reddened only very slightly.

The Du Pont forces are also placing on the market and completing their present line of colors in the Naphthanil series by offering Du Pont Naphthanil Scarlet R. Base.

This base is used either with the Du Pont Naphthanil AS or BS for producing brilliant yellowish pinks or vivid reds. The shades obtainable from this product possess the same fastness qualities as those produced with the Du Pont Naphthanil Scarlet G Base.

With this new addition, it will complete a range whereby the consumer should have no difficulty in obtaining any desired shade of reds or pinks, to meet with the demands of the cotton industry.

Detailed information as to the above products may be obtained at any of the company's branch offices.

S. O. C. M. A. ELECTS OFFICERS FOR YEAR; DR. HERTY CONTINUES AS PRESIDENT

Officers elected by the Synthetic Organic Chemical Manufacturers Association of the United States at its first Annual Meeting at the Hotel Pennsylvania, were as follows:

President, Chas. H. Herty; Vice-Presidents, Dyestuff Section, C. N. Turner, New Port Chemical Works, Passaic, N. J.; Intermediate Section, Chas. A. Meade, E. I. du Pont de Nemours & Co., Wilmington, Del.; Pharmaceuticals Section, Herman Seydel, Seydel Manufacturing Company, Jersey City, N. J.; Fine Organic Chemicals Section, P. Schleussner, Roessler & Hasslacher Company, New York City; Treasurer, Donald McKesson, McKesson & Robbins, New York City. Board of Governors: Vice-Presidents, *ex officio;* August Merz, Heller & Merz, Newark, N. J.; F. P. Summers, Noil Chemical & Color Works, New York City; S. Iserman, Chemical Company of America, New York City; F. E. Signer, Butterworth-Judson Corporation, New York City; W. T. Cashman, Grasselli Chemical Company, Cleveland, Ohio; S. W. Wilder, Merrimac Chemical Company, Boston, Mass.; A. S. Burdick, Abbott Laboratories, Chicago, Ill.; Donald McKesson, McKesson & Robbins, New York City; F. L. McCartney, Monsanto Chemical Works, St. Louis, Mo.; James T. Pardee, Dow Chemical Company, Midland, Mich.; Charles H. Herty, *ex officio.*

Arthur D. Holmes, research chemist Jackson Laboratory, E. I. du Pont de Nemours & Co., has resigned to establish a research laboratory for E. L. Patch & Co., Boston, Mass.

To the end that scientific research may be furthered, plans have been formulated for co-operation between representatives of the different divisions of the textile industry and the Bureau of Standards. Committees will be appointed in the wool, worsted, cotton, silk and associated divisions to co-operate with officials of the bureau in conducting research tests and experiments. These committees are to be named in conjunction with the leading trade organizations, and a series of conferences will be held preliminary to a joint conference next fall.

Horn Manufacturing Company, Greensboro, N. C., recently organized, is installing equipment for the manufacture of carpets and rag rugs. Rags will be purchased from cotton mills and converted into rugs and carpets. The president of the company is S. B. Tanner, well-known cotton manufacturer of the South, and associated with him are S. E. Elmore, Carl Horn and C. B. Howard.

ROXFORD KNITTING CO. UNDER AUCTIONEER'S HAMMER; MACHINERY AND DYEHOUSE EQUIPMENT IN SALE

Announcement has been made by Samuel T. Freeman & Co., 1519-1521 Chestnut Street, Philadelphia, auctioneers, of a receivers' sale in equity of the plant, real estate, machinery and equipment of the Roxford Knitting Company, located at Randolph and Jefferson Streets, that city. This sale will be held at 10 o'clock A. M. each day on the premises, Thursday and Friday, June 8 and 9. Full particulars may be obtained from the auctioneers.

Among the effects to be disposed of will be machinery and equipment comprising 107 Wildman and Scott & Williams Latch Needle Body Knitters 13-24 inch, 250 Crane, Campbell & Clute and Tompkins Body and Balmoral Knitters 10-24 inch, 29 Copper Spring-Needle Body and Cuff Knitters 17-22 inch, 10 Tiffany 5-Band Cuff Knitters, 35 Allen & Payne Bobbin Winders, Davis & Furber Fleecer, 25 Finishing Machines, Calendar Machine, 550 Sewing Machines, including Singer, Union Special, Metropolitan, Merrow, Willcox & Gibbs and Union Button and Buttonhole, Embroidery, Flat-Lock, Twin-Needle, Seaming, Welting, Shaping, Lock-Stitch, Single and Double Needle Machines, Eyelet and Stamping Machines, 10 Eastman, Ballard and Naiman Electric Cutters, 6 Crawford Hydraulic Hot-Plate Presses. Also Paper Box Plant, comprising Slitting, Covering, Rewinding, Edging and Corner-Cutting Machines, Brown & Carver Paper Cutter, etc. Also Dyehouse Equipment, comprising 12 Dyeing Machines, 7 Shaumm & Uhlinger 50-inch and 56-inch Extractors, Steel Keers, Davis Cleaner, Dye and Soap Tubs, Tanks, etc. Also Complete Printing Shop, including 2 Presses, Type, etc. About 500 Box Trucks, 500 Chairs, about 250 Seats, Steel and Stock Shelving, 100 Pine Stock Tables, Benches, Partition, etc. Also 120 General Electric and Diehl Motors from 3 to 10 H.-P., Drill Press, Lathes, Platform Scales, Time Clocks, Shafting, Belting, etc. Office Furniture, including about 7 Royal, Remington and Underwood Typewriters, International and Burroughs Adding Machines, Billing Machines, Dictaphones and Addressographs, Oak and Mahogany Flat-Top and Typewriter Desks, Oak and Steel Letter and Card Index Filing Cabinets, Safes, Office Chairs, Partition, Trade Marks "Roxford" and "Florine," Advertising Cut-Plates, Printed Box Tops, miscellaneous advertising material, woven labels; also credit files and list of customers.

W. H. CADY LEAVES U. S. FINISHING COMPANY

Shortly before going to press news reached The Reporter that William H Cady, who has for several years acted as chief chemist for the United States Finishing Company, making his headquarters at its Silver Spring Branch, Providence, R. I., has severed his connection with this concern. Mr. Cady, with his customary reticence, declined to discuss either the occasion for his leaving or his plans for the future, other than to admit that the latter were indefinite.

Mr. Cady has long been a prominent figure in the field of color application. For several years prior to his acceptance of the position with the United States Finishing Company he had been associated with the Badische Company and has been generally recognized by textile colorists as an authority on all color application questions. He has been extremely active in the American Association of Textile Chemists and Colorists, of which he is a vice-president, and for the organization of whose Rhode Island Section he was responsible.

The Reporter wishes Mr. Cady all success in whatever future connections he may establish and feels sure that the concern which is fortunate enough to secure his services is to be sincerely congratulated.

PREPARATIONS NOW UNDER WAY FOR EIGHTH CHEMICAL SHOW, AT GRAND CENTRAL PALACE

The Eighth National Exposition of Chemical Industries will be held this year in the Grand Central Palace, New York City, during the week of September 11 to 16, inclusive. It will follow immediately upon the Fall Meeting of the American Chemical Society. "Raw Materials, Machinery, Products" is the featured line describing the Exposition this year, and the affair is intended to carry this main impression. The raw materials are exhibits of the natural resources from out of the earth and above the earth. The machinery exhibits consist of apparatus and equipment and instruments for control, precision, recording, gauging, measuring, and machinery for every mechanical operation in the manufacture of products from the raw materials. The products themselves are the finished products and the exhibits will contain those of organic, and inorganic origin, of solid, liquid, or gaseous form, and of every conceivable nature. Many new things upon which manufacturers were working when the war ended, and which have been since more leisurely perfected. will be shown for the first time. Industrial progress continually calls for advancement and progress in manufacture, and each year we have many notable improvements in the exhibits at the Exposition.

Counting only these; the time of technical and business men is well and advantageously spent in inquiring into the things on exhibit. One exhibitor, who for the past few years has been devoting time to the perfection of a new form of apparatus, said the other day that now, when men have time to spare for consideration of these things, he expects considerably larger and more interested attendance at his booth. "When the plants are idle as they are now the most progressive companies are examining into our apparatus, and a remarkable thing is that we are making some installations in plants which are now closed, so that when they begin their work they will be in a better position than ever and have an advantage in taking this opportunity to prepare to reduce their costs

for the future. I'm looking for many more such openings through our exhibit and with considerable enthusiasm for the entire Exposition."

The managers report that three full floors of the Grand Central Palace, and part of the fourth, are already taken for the Exposition. There are at this time 350 exhibitors who have contracted for their space locations. In the Exposition there are two special sections, one upon the subject of Fuel Economy, where exhibits intended for the more efficient use of fuel, its combustion, distribution or control, will be made; the other where the subject of shipping containers will be given considerable attention and will have to do with the container itself, whether of metal, wood, fiber, paper or the cooperage of slack or tight barrels, tanks and towers with machinery for packaging, labeling, handling and conveying the packaged material and, lastly, making it ready for final shipment. This section will furnish the complete ideal for any industrial plant. There will be groups of exhibits of glass and ceramic products. Laboratory equipment will be thoroughly represented. There will be a group of Canadian exhibits where the natural resources of the adjoining Dominion will be made and there will also be a Southern Section where not only the resources of our South but of the manufactured products coming from that section will be made.

The program of the Exposition has been outlined and work is now in progress upon it, and it may be expected to compare fully with the high standards of the preceding Expositions. As has been the custom, there will be exhibits of motion pictures covering all phases of the chemical industries and the Exposition will hold many interests for every visitor.

The office of the managers, Charles F. Roth and Fred W. Payne is in the Grand Central Palace, New York City, and inquiries should be directed to them there.

The New York Color & Chemical Company has leased space in the new building at 12 Gold Street, that city.

To keep up with their increasing business in the New York district the Germantown Dye Works, Germantown, Pa., have opened an office at 441 Broadway. W. W. McWhinnie, formerly with the Viscose Company, is in charge of the new office.

Charles F. Hobson, formerly general manager, Westchester Chemical Company, Pelham, N. Y., is now with the Wamesit Chemical Company, Lowell, Mass.

The British Cellulose & Chemical Manufacturing Company reports a loss of £1,099,305 for the fiscal year ended with June 30, 1921. The common stock has been reduced from £2,300,000 to £1,150,000.

The American Dyes Institute, dating from May 1, has given up its office in the Bush Terminal Building, and hereafter mail sent to that organization will be forwarded to the Synthetic Organic Chemical Manufacturers' Association, 1 Madison Avenue. While the Dyes Institute and Synthetic Association are two separate bodies, most of the members of the former are also members of the Association, and the two organizations have always co-operated in working for the dyestuff industry. It is not expected that the Dyes Institute will be broken up, but will simply cease to function.

Dr. Theodore W. Doell, formerly with the du Pont organization, is director of the Industrial Chemical Laboratories, Oakland, Cal., recently established to engage in consulting research and analytical work.

John F. Queeny, chairman, board of directors, Monsanto Chemical Works, St. Louis, Mo., completed on March 28 a half century of activity in the chemical industry.

Morris Knitting Mills, Brooklyn, N. Y., with mill at 1329 Myrtle Avenue, are building a new mill on De Kalb Avenue. The latter plant will be three stories, and will be built at a cost of approximately $40,000. The architect is Henry J. Nurick, 44 Court Street, Brooklyn.

WANTED, COLORIST

Wanted by large manufacturer of dyestuffs, colorist who has had scientific training in dyestuff chemistry. Applicant should be familiar with the practical application of all kinds of dyestuffs and must be able to conduct all work necessary for the investigation of new colors. Address Box 211, American Dyestuff Reporter.

WANTED, LABORATORY MAN

Wanted by large dyestuff manufacturing concern, reliable man to take charge of routine work in dye laboratory. Applicant must be familiar with the dyeing and testing of all classes of dyestuffs, including vat colors. Man who has had practical dyeing experience is preferred. Address Box 212, American Dyestuff Reporter.

Large manufacturer has good opportunity for dyestuff salesman who is well acquainted with woolen and worsted mills in Rhode Island and Connecticut. Reply to Box 213, American Dyestuff Reporter.